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Western Australian Audit of Surgical Mortality (WAASM)
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Case Note Reviews
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Australian and New Zealand Audit of Surgical Mortality

Royal Australasian College of Surgeons

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Editorial note

In 2012, all London hospitals admitting emergency patients were assessed against a list of 26 standards drawn up by London Health (1). Many of these evidence-based standards were derived from the National Confidential Enquiry into Patient Outcome and Death (NCEPOD), the mortality audit of the Royal College of Surgeons of England.

At the invitation of the Western Australia (WA) Minister of Health, Professor Derek Bell, a team from the United Kingdom visited Perth in July and August 2013 to assess WA teaching hospitals against the London Health Standards. The London Health Standards represent good, evidenced-based care and are as applicable in WA as in London. They are a good yardstick against which WA surgeons can measure the care of their patients.

Almost all of the cases in this collated Case Note Review booklet failed to meet at least one of the London Health Standards. Many failed to meet several.

(1) http://www.londonhp.nhs.uk/services/quality-and-safety-programme

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Case 1: Earlier diagnosis and intervention may have prevented major complications and death

A regular-smoking, elderly patient had the past medical history typical of a vasculopath, including ischaemic heart disease, chronic obstructive airways disease and hypertension. A previous aortobifemoral bypass had been undertaken after a previously failed right common iliac to profunda femoris bypass graft. The aortobifemoral bypass graft was complicated by infection of the right limb of the graft which subsequently required excision and oversewing with a prolonged course of antibiotics. There were also bilateral superficial femoral artery occlusions and eventually a left femoro-popliteal bypass and toe amputation late in the same year.

Thus, the right leg was being supplied by lumbar collaterals and flow from the patent left limb of the aortobifemoral graft. There was some claudication on the right leg as a result, though this was not severe.

Six months later, the patient was reviewed in the vascular clinic by the senior registrar. This review stated that the patient had recently developed critical right leg ischaemia. An ultrasound was arranged and the patient next seen two months later. The ultrasound suggested a stenosis of the left limb of the aortobifemoral graft as well as an ankle/brachial index on the right leg of only 0.17 which is critically low and usually in keeping with pre-gangrene. A Computed Tomography (CT) scan was arranged which only occurred one month later. It does not appear that any consultant was made aware of either of these two clinic appointment outcomes and management. The CT showed the aortobifemoral bypass graft was completely occluded. There is no mention of the vascular surgical team being informed of this result by the radiology department.

The patient, who lived in the country, was admitted to the local rural hospital three days after the CT had been performed with severe leg and foot pain that had worsened over the preceding 48 hours. It appears that the correct diagnosis and severity of the situation was not appreciated as there was a request for a lumbosacral x-ray when the aetiology of the foot pains were clearly ischaemic in nature. On the afternoon of that day (about 24 hours after the initial admission), advice was sought from the vascular surgical team at the tertiary hospital. Swift transfer via the Royal Flying Doctor Service (RFDS) then occurred.

On arrival at the tertiary hospital, an urgent operation was arranged due to the severity of the ischaemia and mottled appearance of both legs up to the lower abdomen. A bilateral axillofemoral bypass was performed in order to bypass the occluded aortobifemoral bypass. The patient also had bilateral calf fasciotomies due to the prolonged ischaemia and a note was made that the left anterior compartment was not viable. There were no intraoperative complications and the patient was then transferred to the Intensive care Unit (ICU).

The next morning, it became obvious that the left leg was not viable and later that day the patient was returned to theatre for a left above-knee amputation and then returned to ICU. Subsequently, the patient developed multi-organ failure and the right leg also became nonviable and would require an above-knee amputation despite a patent axillofemoral graft. Discussions with the family ended up, rightly, with a decision to treat palliatively as opposed to proceed with amputation.

Comment

Although the final outcome may have been similar, there were considerable delays in both diagnosis and intervention prior to and after the aortobifemoral graft occlusion. It is clear that there was a delay in the preoperative transfer of the patient. Had transfer been arranged immediately, the limbs may have been salvaged with the bailout operation of the bilateral axillofemoral grafts prior to the irreversible ischaemia.

Just as concerning was the long delay from the moment the patient was first seen in the vascular clinic. The diagnosis of ‘critical ischemia’ required a much more rapid diagnosis as opposed to an ultrasound two months later. An urgent CT would have been much more appropriate than a non-urgent ultrasound which would surely have been followed up by a CT (as was the case). Even after the ultrasound and clinic review two months after the initial clinic appointment, it was another month before the CT was performed which is a long delay for critical ischaemia. The first-line assessor noted that the patient was discharged from the radiology department without the team being made aware that the aortobifemoral graft was blocked. This is true, but judging by the long delays in diagnosis from the patient's clinic reviews until the CT scan three months later there is no assurance that any action would have taken place even if the team had been informed of the situation of the occluded graft.

Although there are delays and inefficiencies in the public health system, urgency of the problem was not fully appreciated on the initial clinic appointment. Newly developed critical ischaemia on a background of an aortobifemoral graft with the right limb requires urgent CT or angiography in order to prevent limb loss and this principle was not adhered to. More urgent attention and prophylactic intervention may have prevented the graft from blocking off in the first place.

The 24-hour delay in the rural hospital prior to transfer was an avoidable problem which may have changed the outcome. Had the severity of the ischaemia been assessed accurately, it may not have proceeded to irreversible ischaemia which played a major role in the patient's death.

Case 2: Technical problems with endovascular graft result in arterial rupture

A very old patient was admitted for elective endovascular aneurysm repair of a common iliac artery aneurysm. The past medical history included deep vein thrombosis, Type II diabetes, renal impairment, Wegener's granulomatosis, mixed mitral valve disease, and a cerebral vascular accident (CVA) affecting the right side with full recovery. The pre-procedural American Society of Anesthesiologists (ASA) classification was Class IV (by the anaesthetist). The patient lived at home with a son and needed some assistance with bathing, grooming and transferring, and ambulated with mechanical assistance.

During the procedure, an endovascular stent graft was delivered into the infra-renal aorta in good position. Deployment of the limb was then performed. However, on the left side (the side with the large left common iliac artery aneurysm); the planned limb was short of the desired landing zone after deployment and required an extension piece. When the extension limb delivery system was put in, a lot of force was required to track it over the wire, nudging the existing limb back into the aneurysm and pulling the external iliac artery off the common iliac artery at its origin. Despite surgical exposure of the artery on table and appropriate resuscitation, the patient did not tolerate the blood loss and died.

Comment

This elderly, frail patient with multiple co-morbidities was not deemed fit for open surgical repair. The common iliac aneurysm was large so the rupture risk was considerable. An endovascular solution was the only option to prevent rupture of the common iliac artery aneurysm—invariably fatal. The indication for treatment was, therefore, sound.

The usual treatment is a bifurcated stent graft inserted via the groin arteries, as here. The tortuosity of the iliac vessels in addition to the frailty of tissues in an elderly patient created problems with the device delivery. The inability to deliver a device and/or difficulty in delivering a device and deploying a device are recognised potential complications of tortuous iliac arteries.

If device delivery and deployment difficulties are anticipated in advance, as in this case, a through and through stiff wire can be placed from the arm to the groin to aid in delivering of the stent graft devices through the tortuous vessels. If through and through wires are used, they have to be placed before the device is inserted as they cannot be placed once the device is in the way.

The treating surgeon remarked upon this possibility, and it is possible that had a through and through wire been placed in advance, insertion and subsequent deployment may have been facilitated, although this is not guaranteed. Placement of a through and through wire has its own complications and is not a guarantee of device delivery.

Most endovascular devices are planned on an imaging workstation in advance, although this is not always undertaken for straightforward aneurysmal disease. This device was planned by a graft company and, unfortunately, the left (and most relevant limb) of the device fell short of the landing zone. There is always an element of error possible from planning, even on three dimensional workstations, and it is not unusual to have to place an additional limb to get a secure seal—the surgeon's intention.

Case 3: Compromised patient with trochanter fracture and delayed surgery

An elderly patient was admitted with a hip fracture following a fall at home. The previous history included a right-sided hemiparesis secondary to a CVA, asthma, gastro-oesophageal reflux disease (GORD), mild heart disease and colon cancer. Two years previously, the patient had undergone a Hartman's procedure for a rectal carcinoma which was probably not curative. The patient had shortness of breath and a pleural effusion after surgery, and was not regarded fit enough for chemotherapy and radiotherapy.

During the last year, the patient mobilised at home with a Zimmer frame but was respiratory-compromised and used Ventolin, Spiriva and Digoxin for atrial fibrillation (AF).

X-rays showed a four fragment trochanter fracture and metastases in the lungs. Urine output dropped over the day to zero. The patient was treated with fluids but the blood pressure (BP) remained low.

The next day, the patient was taken to theatre for stabilisation of the fracture with a proximal femoral nail (PFN). Surgery was cancelled due to a serious drop in blood pressure (60/40) after spinal anaesthesia and patient returned to the ward after fluids, Aramine and Ephedrine were given and there was a gradual increase in blood pressure. There was increasingly poor urine output over the day and night, and it was juggled with Furosemide and fluids.

Two days after admission, a medical emergency team (MET) was called at 09.00 for hypotension. The patient now had haemoglobin (HB) of 61 and was given Gelofuse and two units of red blood cells (RBC) as well as fluids. The blood pressure recovered and not a problem in the following days. The patient slept comfortably that night but was increasingly chesty, although with satisfactory saturation on oxygen. The next day, the patient was found to be alert and not in pain, afebrile, normotensive and saturation 88% on oxygen.

A new attempt at operating was, therefore, undertaken on the fourth day after admission. The patient and relatives were again informed about the difficult situation. The fracture was stabilized with a PFN nail.

Post-surgery, the patient was normotensive and oriented, afebrile with a systolic blood pressure around 120 and 95% saturation on oxygen. The haemoglobin was found to be 101 but the breathing was increasingly laboured. There was crackling in both lungs and management included Ceftriaxone, Salbutamol and Spiriva.

Six days after surgery, it was decided to withdraw treatment and the patient died.

Comment

This is not an uncommon outcome after a serious hip fracture in an elderly compromised patient. We know the importance of early operation on these patients. In this case, the patient was taken to theatre within a reasonable time, but due to low blood pressure the procedure was unfortunately stopped. Whether this was the correct decision is not clear. Certainly, the patient was returned to the ward with a low blood pressure and only after the first MET call the following day was the blood pressure and haemoglobin adequately managed.

I see no major problem with the PFN nail as this was a four-fragment fracture and hard to fix with a dynamic hip screw (DHS). A patient with compromised lungs might, however, be overloaded by fat emboli when doing femoral reaming and nailing. A distal vent hole and appropriate reamers had been used, but this information is not available.

The initial and preoperative care was a crucial issue and could have been handled better. A serious four-fragment trochanter fracture will naturally bleed and patients will become anaemic, hypotensive, have low urine output, and so on. This would have been especially so here given the asthma, pulmonary metastasis, low initial haemoglobin, and so on. A comprehensive medical and anaesthetic review at an earlier stage would have given a better preoperative work-up.

Case 4: A Jehovah's Witness with haematuria

A late middle-aged patient was admitted to the Emergency Department with a four-hour history of haematuria, clots, dysuria and retention. This was on a background of extensive ischaemic heart disease including two recent Emergency Department admissions and an angioplasty within the last three weeks. The patient was on anti-platelet agents. Other relevant medical history included hypertension, congestive cardiac failure, type II diabetes and diffuse B-cell lymphoma. Clerical staff also noted the patient was a Jehovah's Witness and an entry was made later by the Emergency Department Registrar. Communication was made difficult by limited English and the daughter was used for translation.

Some fifteen hours after the admission, the patient was found to be unwell (BP 100/47, heart rate 70) with catheter bypassing and marked abdominal distension. The patient was in the process of being reviewed by the surgical team, with a plan for cystoscopy. The haemoglobin was 73.

Cystoscopy was performed and clot evacuated. Haemorrhagic areas were coagulated with good effect. Intraoperatively, the haemoglobin dropped to 54. The anaesthetist had documented the Jehovah's Witness status after speaking to the patient's family and a note was made that no blood products were to be used.

Postoperatively, the patient was admitted to ICU. Discussions occurred with the surgical team, haematologist and cardiologist regarding the anti-platelet agents, the use of erythropoetic stimulants and high likelihood of chest pain and ongoing cardiac ischaemia. Further discussion with the family and the patient regarding the use of blood products was undertaken. It was clearly documented that the patient and the family had refused.

Over the next few days, the patient experienced ongoing chest pain, reduction in urine output and general deterioration. The cardiac enzymes were rising due to anaemia-related ischaemia. The patient and family made a decision that the patient was not for resuscitation. Six days after admission, the patient died, likely from anaemia-related cardiac ischaemia.

Comment

The main area of concern was the initial delay in recognising the Jehovah's Witness status and communicating this to the surgical team. Although the clerical staff made note of the Jehovah's Witness status, it was not flagged nor taken into account. This was important given the patient’s anti-platelet agents and active bleeding and may have been complicated by the patient's limited English, but no attempt was made to use an interpreter other than the family. Furthermore, once the Jehovah's Witness status was identified, it appears it was not communicated to the surgical team. If it had, earlier surgical intervention could have been considered. The discussion regarding the use of blood products did not occur until the following morning when the anaesthetist discussed this with the family.

A further area of concern was the delay in intervention. During the twelve hours following admission, there were several episodes of the catheter blocking, manual evacuation of clot and abdominal pain. It was not until the morning ward round that the surgical team were informed of any problems and by that stage the patient's condition had deteriorated. It took a further two and half hours to get the patient to theatre. Once in theatre, the patient was managed appropriately and there were no further bleeding issues.

A point of consideration would be whether the nursing management of a patient with clot retention and bladder washout would have been better managed on the surgical team's home ward. This may have resulted in sooner intervention.

It is unclear as to the exact timing of the acute myocardial infarction. However, the ongoing severe anaemia and refusal of blood products in a high-risk patient was certainly contributing. It is difficult to know how much the Jehovah's Witness status and blood product issue solely resulted in this outcome as in the weeks leading up to this admission, the patient had repeated episodes of cardiac events requiring cardiological intervention. This alone would have put the patient at risk of morbidity or mortality related to a cardiac event.

Case 5: Missed femoral hernia

This patient lived in a high-level-of-care nursing home and suffered from atrial fibrillation, osteoporosis, back pain, impaired mobility and dementia. The patient was admitted to a metropolitan hospital with a five-day history of progressive deterioration, decreased appetite, vomiting and abdominal pain. On admission, the patient was noted to have AF and was saturating at 93% on room air. On examination, the patient was noted to have a distended abdomen and tenderness in the right ileac fossa.

In the Emergency Department, an abdominal x-ray identified dilated small bowel loops with air fluid levels. Gas and faeces in the rectum were seen but no evidence of free air under the diaphragm. The report suggested a partial small bowel obstruction. There was no evidence of overt sepsis and the inflammatory markers were mildly elevated with a C-reactive protein (CRP) of 23 and a white cell count of 12.9 with adequate electrolytes, as well as a creatinine of 55 and elevated urea at 13.6.

The emergency department (ED) doctors felt the patient was constipated. A management plan for constipation was instituted. Suppositories were prescribed and if there were no results within half an hour, an enema was due to be instituted, and if that did not succeed a manual evacuation was suggested. It was later felt that the patient needed an admission under the medical team with a suspected diagnosis of constipation. The resident medical officer (RMO) who reviewed the patient had the impression the patient had partial bowel obstruction. Intravenous (IV) hydration was instituted, laxatives were prescribed and the dietician's review requested.

On the second day, the consultant physician suggested insertion of a nasogastric tube and a gastrografin enema was requested. An abdominal x-ray was performed and this showed persistent small bowel obstruction. There was still some gas in the rectum and a partial small bowel obstruction was again suggested. The patient was noted to have a non-tender distended abdomen with normal bowel sounds; there was still bibasal crepitation. The patient was IV hydrated at 80ml/h, was nil by mouth and refused a nasogastric tube.

Later that day, a surgical review was requested. The surgeon identified an incarcerated tender femoral hernia and a decision for an operation was undertaken.

The anaesthetists at the metropolitan hospital felt the patient was too high a risk for surgery there. The patient was transferred to a teaching hospital. At laparotomy, there was an infarcted small bowel with a localised perforation. This was resected. Postoperatively, the patient's recovery was slow but, after review by the intensive care team, the patient was deemed not to be a candidate for ICU. The patient died from a pulmonary oedema on the fifth postoperative day.

Comments

On review of the medical records, it was noted that the discharge summary from the metropolitan hospital was incomplete and did not correctly reflect the episode of care at that hospital.

The significant event that contributed to the death of this patient was the delay in diagnosis of an incarcerated femoral hernia. This, in my opinion, was primarily due to:

1. Failure to recognise a femoral hernia on examination by the medical team. This would have been obvious if the groins were examined adequately in the Emergency Department or by the medical team.
2. The abdominal x-ray probably misled the medical team. It appears from the notes that they were misled by the presence of air and faeces in the rectum. This small bowel obstruction can afford a period of conservative management.

I would recommend education to the emergency department and the medical team with respect to the essential diagnosis and management of small bowel obstruction. The presence of significant small bowel dilation with air fluid levels such as this should raise the possibility of a mechanical obstruction rather than just simple constipation.

Case 6: Remember the hernia orifices

An elderly patient was transferred from an aged hostel with vomiting after eating a meat pie. There was long-standing smoking-related chronic airways disease and hypertension. Mobility beyond five metres was with a “gopher”.

There was no initial complaint of abdominal pain and, on examination, the abdomen was not tender. There was no reference to the hernial orifices. The patient was dehydrated, in acute renal failure and initially hypotensive. The chest x-ray was consistent with interstitial lung disease. An abdominal x-ray was not performed.

The patient was admitted under the physicians for rehydration with a presumed diagnosis of gastroenteritis. Over the next few days, there was a rapid improvement in the renal function but ongoing vomiting requiring regular metoclopramide and ondansetron.

On day three, the patient became tachycardic and there was a non-ST elevation myocardial infarction and pulmonary oedema. Following transfer to the critical care unit (CCU), the patient was cardioverted on day five. Following this, the abdomen was noted to be distended without pain, tenderness or guarding. A nasogastric tube was inserted and two litres of faeculant fluid was aspirated. The patient was deemed too unstable to be sent for abdominal x-ray.

On day six, the patient was seen by a surgical registrar, who found a non-tender, non-distended abdomen. Hernial examination did not reveal any herniae. It was noted that due to other co-morbidities the patient was unlikely to be a surgical candidate. On day seven, the abdominal x-ray (AXR) showed a non-specific bowel gas pattern with no evidence of obstruction. The following day, repeat AXR showed a small bowel obstruction.

Nasogastric aspirations continued to be high (over two litres a day). On day twelve, an abdominal CT was performed. The CT scan showed an obstructed right inguinal hernia. The patient refused operation and died four days later—day sixteen after admission.

Comment

Patients with small bowel obstructions always require examination of the inguinal and femoral orifices to exclude hernia as a cause. By the time of diagnosis of the obstructed femoral hernia, the patient decided to refuse surgical intervention.

Case 7: Complication of ECMO in respiratory failure

A middle-aged patient was transferred to a private hospital from a public hospital for management of a left upper limb thrombosis and ongoing fevers eight days following chemotherapy for Hodgkin's lymphoma and possible bleomycin toxicity. The positron emission tomography (PET) scan showed the patient was in remission. The past history included a deep vein thrombosis (DVT) following arthroscopy managed with six months of warfarin.

The patient was stable enough to be managed on the ward with IV antibiotics, clexane and oxygen. The patient deteriorated over the next eight days and was transferred to ICU for ventilator support.

Despite institution of biphasic positive airway pressure (BiPaP) in ICU, the patient tired over the next twelve hours and was intubated. The oxygen saturations were satisfactory at this time although, of note, the CVP was 30-35 mm hg with a systolic blood pressure of only 95. The patient remained stable and ventilation weaning gradually commenced. Computed Tomographic Pulmonary Angiography (CTPA) confirmed a large (4 cm) proximal left pulmonary embolus and multiple small right pulmonary emboli. The blood pressure required continual support with noradrenaline and the CVP remained high. The white cell count confirmed a septic picture.

The second day after admission to ICU, the patient had a second large pulmonary embolus which required thrombolysis. Following this event, the noradrenaline requirements increased substantially and vasopressin was added. Following administration of alteplase, the saturations improved and the noradrenaline requirements decreased. However, gradual deterioration occurred over the subsequent three days and the oxygenation became extremely poor. A family meeting was held and the patient was transferred to a public hospital for institution of veno-venous extracorporeal membrane oxygenator (ECMO).

On arrival at the public hospital, the patient was transferred to the ICU and an attempt was made to insert a right jugular two-stage ECMO cannula. A new pericardial effusion was noted and drained percutaneously. The patient then became unstable and an emergency sternotomy was performed in the ICU with successful oversewing of the right ventricle (RV) apex. Poor haemodynamics and RV function at this stage necessitated the institution of ECMO with cannulation of the ascending aorta. The patient was taken to theatre the next day and underwent embolectomy for the large pulmonary embolus. Over the subsequent four days, the ECMO was weaned and removed. A pericardial collection was evacuated the day after removal of ECMO. The patient gradually improved but then became progressively septic over the next four to six weeks, was diagnosed with H1N1 infection and treatment was withdrawn. The patient died shortly after, approximately two months after the initial private hospital ICU admission.

Comment

Not withstanding the comments of the first-line reviewer notes, I do not feel there was any major adverse surgical event that contributed to this patient's death.

The delay between admission to the private ICU and institution of ECMO was completely valid as the patient was initially treated with antibiotics for pneumonia, clexane for a DVT/PE with stable haemodynamics and then alteplase when a second pulmonary embolus occurred. This is accepted management and it was only when there was further deterioration that the patient was transferred for institution of ECMO. However, earlier transfer to a tertiary referral centre when the second pulmonary embolus occurred may have been prudent. In addition, the ECMO was initially instituted for respiratory distress rather than haemodynamic instability as all inotropic and vasopressor support had been weaned by that stage.

The second query regarded the use of ECMO as opposed to pulmonary embolectomy in the first instance. From reading the ICU notes, it is clear that the diagnosis at this time was of respiratory failure, with a CXR indicating acute respiratory distress syndrome (ARDS) or intercurrent infection. There was little suspicion of ongoing pulmonary embolus at this time. Institution of veno-venous ECMO would be appropriate in selected patients. Performing an embolectomy would only be indicated with confirmed ongoing instability and the presence of a sizeable embolus. The notes from the public ICU are lacking in this regard.

The only questions that arise from this case relate to the decisions surrounding institution of ECMO and the technical aspects of doing so. In a relatively young patient with confirmed malignancy and respiratory distress a decision must be made as to the likely outcome for the patient. There are reasonable grounds to undertake this procedure if there is full support from the intensive care, oncology, respiratory and cardiothoracic teams but the prognosis is extremely poor.

Additionally, the decision to use a jugular venous cannula in the first instance is dependent on the expertise of the surgeon. In this case, the insertion was complicated by perforation of the RV and the need to perform emergency sternotomy in ICU and institution of VA ECMO. This is a significant complication, but it is unlikely it alone changed the eventual outcome. It may have been preferable to use a bilateral femoral venous

approach which is usually safer. However, the presence of femoral lines, previous cut downs or vessel size in the smaller patient may make this impossible.

The third issue is difficult to assess as the notes provided do not make clear the reason for performing a pulmonary embolectomy the next day; however, the poor RV function at the time of ECMO insertion may have been the reason. Regardless of this, the patient improved and support weaned. Unfortunately, the comorbidities proved to be too great and the patient eventually succumbed to the illness. It is unlikely that any different treatment would have prolonged the patient's life further.

Case 8: Difficult decision regarding DVT prophylaxis in a patient suffering from symptomatic rectal carcinoma

An elderly man presented with blood loss per rectum (PR), recurrent diarrhoea, faecal incontinence and general deterioration. These symptoms occurred over a six-month period and were associated with a 40 kg weight loss. The referring general practitioner (GP) had requested a CT scan that identified a circumferential tumour at the junction of the middle and lower third of the rectum extending to the internal sphincter. There did not appear to be any distant metastases. The diagnosis was confirmed at colonoscopy. The surgery was planned to take place eight weeks after completing chemo-radiotherapy.

Concerns were expressed by the oncologist about the patient's comorbidities and the patient's cachectic appearance. The patient was not fit, being a heavy smoker with chronic obstructive airways disease and emphysema. Bilateral pleural effusions and ascites were noted on the initial CT scan. Respiratory function studies were, however, surprisingly satisfactory. The patient was known to have significant coronary artery disease with a history of a previous myocardial infarction, aortic regurgitation and a Left Ventricular Ejection Fraction (LVEF) of 55%. A preoperative cardiological assessment was undertaken and this did not indicate any requirement for interventional measures before the surgery.

Chemoradiotherapy was completed and the patient was admitted for planned surgery. Immediately before admission, the patient developed multiple pulmonary emboli. An intravenous catheter (IVC) filter was inserted preoperatively and full prophylaxis for prevention of thromboembolic disease was commenced.

The operation to resect the rectum was performed the following day. Some bleeding from the prostate was noted during surgery. The anaesthetist was also concerned about Electrocardiogram (ECG) changes which suggested an intraoperative inferior ST-Elevation Myocardial Infarction (STEMI) and this was associated with a rise in serum troponins. Because of these problems, the patient was transferred to the ICU. In view of the surgeon's concern regarding bleeding from the pelvis and a decision by the anaesthetist to position an epidural catheter, the anticoagulation was discontinued for 24 hours post-surgery.

The patient continued to experience chest pain and was transferred from the ICU to the Cardiology Unit where an angiogram was planned once fully re-anticoagulated. The patient became increasingly short of breath and a Computed Tomographic Pulmonary Angiography (CTPA) showed multiple pulmonary emboli despite the IVC filter. Clexane therapy was added. Nine days after his operation, he had a cardiac arrest and attempts at resuscitation were unsuccessful.

Comment

The overall management of this patient followed a predetermined management plan.

I do not believe the decision to undertake radical surgery was a contentious issue (as assessed by the first-line assessor). Untreated, or simply palliated, rectal cancer has a prolonged and miserable clinical course and, given the presenting symptoms, the planned treatment was entirely reasonable. I would, however, classify the risk of death from surgery as 'considerable'.

The only other issue concerns the lack of anticoagulation for the 24 hours after the operation, given the history of recurrent pulmonary emboli. From the case notes, it is apparent that this was a decision taken by senior clinicians concerned about bleeding following surgery and the advantages of being able to insert an epidural catheter. There was an IVC filter in position.

I would, therefore, conclude that although there was a considerable risk attached to radical treatment for this patient, all steps were taken in a planned and reasoned fashion. I can find no significant adverse factors in the management of this very difficult clinical situation.

Case 9: Complications of upper GI surgery

An otherwise healthy elderly patient was admitted electively for a total gastrectomy for adenocarcinoma of the stomach. Detailed preoperative staging and assessment, including upper gastrointestinal (GI) MDT review, was undertaken prior to admission. The choice of operative treatment appears entirely appropriate.

A total gastrectomy and Roux-en-y retrocolic reconstruction was undertaken. There was no intraoperative complication and the patient was transferred to ICU postoperatively.

For the first two days postoperatively, the patient progressed well and was discharged from ICU but on day four was noted to be tachycardic and tachypnoeic and developed abdominal tenderness. Mid-morning on day four there was an MET call. The patient was re-admitted to ICU and given antibiotics and general supportive treatment. Mucoid and purulent material was noted coming from drains.

On day five, the patient was slightly worse and there was concern regarding an anastomotic leak. Methylene blue was given orally and subsequently appeared in the drains. A CT scan showed significant fluid in the upper abdomen with air fluid levels.

On day six, the patient was returned to theatre, the collection was evacuated, and the anastomosis supported with an endoscopically placed stent. Progress following the return to theatre was good.

On day ten, there was a sudden bleed from a drain and a drop in haemoglobin from 104 to 92. The bleeding then appeared to stop and a CT scan did not reveal a cause for bleeding. Later that day, there was a sudden drop in blood pressure presumed to be due to haemorrhage. Blood product and fluid resuscitation was instituted and emergency laparotomy arranged. Before this happened, there was a cardiac arrest requiring intubation and cardiopulmonary resuscitation (CPR). At a second return to theatre, bleeding from the coeliac axis was identified and controlled. Despite control of bleeding and maximal medical treatment there was another cardiac arrest on the operating table and the patient could not be resuscitated.

Comment

The two adverse events listed in the surgical case form were anastomotic leak and postoperative haemorrhage. It is not possible to do resectional gastrointestinal tract (GIT) surgery and an anastomosis of any sort without the risk of leakage. The occurrence of a leak does not mean that there has been a deficiency of surgical or medical care. There is not a detailed account of the anastomotic technique used (staples or sutures). Apart from the lack of detail regarding the anastomotic technique, there is a diagram showing a Roux-en Y reconstruction with an end-to-side anastomosis between the oesophagus and the Roux loop, which is standard practice for this operation.

The delayed postoperative bleeding appeared to have been related to one of the drains eroding into the coeliac axis. The presence of drains over a long period in an area of inflammation and infection makes this sort of event possible. I do not think the surgeon can be criticised for leaving the drains given the presence of leakage and infection.

Nutrition is always a problem in GIT surgery and despite total parenteral nutrition (TPN) there was very low albumin for much of the admission. Feeding jejunostomy tubes are advocated by some as a way of providing nutrition post-gastrectomy and may give better nutrition than TPN. Overall, I feel this patient was well managed with no real deficiency in care resulting in their death.

Case 10: Poor care in wrong hospital

A late middle-aged patient presented with acute cholecystitis and was treated conservatively, with arrangements made for a staged laparoscopic cholecystectomy two months later.

There was a significant past medical history including hypertension, type II diabetes, a cerebrovascular accident at a young age, hypercholesterolaemia, gastro-oesophageal reflux disease, obstructive sleep apnoea with chronic obstructive pulmonary disease and depression. The patient was morbidly obese—137 kg, body mass index (BMI) 38.

The surgery was embarked upon laparoscopically but could not be successfully completed and converted. Despite this, adequate visualisation of the cystic duct was not possible and a subtotal cholecystectomy was performed, leaving the neck of the gall bladder.

The management of this patient in the recovery room was difficult, secondary to agitation. This lead to the dislodgement of both the intravenous line and the nasogastric tube and it was decided to only replace the intravenous line. There was abnormal oxygen saturation throughout the recovery room stay (hypoxia).

Further calls were made for medical staff to review the patient later in the evening and the nursing staff rang the anaesthetist regarding inadequate pain relief. The patient was reviewed by an RMO in the late evening and then again later at night regarding the persisting tachycardia and reduced oxygen saturation. A decision was made overnight to transfer the patient to the high dependency unit (HDU).

The patient was re-examined by a medical staff member the following morning and was identified as having worsening urine output and increasing tachycardia and hypoxia. Blood gas analysis showed severe and worsening acidosis and hypoxia.

There was a progressive deterioration and the patient was transferred to a tertiary centre. On arrival, several hours later, the patient was in extremis from advanced multiple organ failure and was requiring high doses of ionotropic support. Resuscitative measures were attempted but these were not successful and the patient died the following morning.

A postmortem revealed the cause of death was multi-organ failure with intraabdominal haemorrhage.

Comment

I have substantial concerns about a number of issues with respect to this patient's care, mainly in the postoperative setting. However, a certain amount can be drawn from the preoperative preparation.

There is little doubt that this patient was a high-risk candidate for this surgery. I suspect the potential needs outstripped what was available in the local hospital. Given the risks involved and the potential for deterioration in a patient with obstructive sleep apnoea, The decision for admission to High Dependency Unit postoperatively should have been made prior to surgery.

I am most surprised that it was considered appropriate to manage the initial postoperative care in the Day Surgical ward. The postoperative observation charts demonstrate a significant and ongoing deterioration. The patient's oxygen saturation on presentation was 98% and this was presumably on room air. The saturation was never above 94% after surgery.

The pulse rate became elevated (97 bpm) in the later afternoon and two hours later had risen further (120bpm).

Clexane was administered to this patient twice in the initial postoperative period and this appears to be against a direct order offered by an RMO. The dose administered of 40 mg was a reasonable dose; however, as a contributing factor of this patient's outcome, this should be considered minor. Nonetheless, intraabdominal haemorrhage was a finding at postmortem.

Little was done, despite clear evidence of developing severe sepsis. Frusemide was administered for the reduced urine output which suggests that the treating doctor considered the patient was in fluid overload. This was a most inappropriate action and, with little doubt, exacerbated the patient's ongoing position.

It is clear that the patient continued to deteriorate overnight and that the nurses sought input from the Emergency Department staff. It appears that the ED doctor did not attend to the patient but, rather, offered instructions by telephone. It should have been apparent that the patient required increasing physiological support; however, an antibiotic Ceftriaxone was prescribed over the telephone and further Frusemide also recommended.

One would have to question whether the hospital involved had a system in place governing the clinical management of the deteriorating patient. Tertiary hospitals employ a medical emergency team. If this hospital has such a system, it clearly was not activated appropriately.

This patient did not receive the level of care required and received too little, too late. There was no recognition as to the severity of the deterioration. It is of concern that this patient was managed by telephone in some instances rather than medically reviewed.

Given all the factors, this patient should have been managed from the outset in a tertiary centre.

Case 11: A lack of continuity of care in a septic patient

An elderly patient presented to an Emergency Department with severe colicky right upper quadrant (RUQ) pain. The previous year, the patient had a cholecystostomy for cholecystitis, having been deemed unfit for cholecystectomy. The reviewing surgical registrar (04:00, Friday) noted a palpable tender gall bladder. An initial assessment of 'no sepsis nor cholangitis' was made. An initial plan of CT-guided cholecystostomy was made.

An ultrasound at noon the same day found the intra-hepatic and common bile ducts were dilated, but there was no further review till later that night. When the patient felt cold and unwell, an RMO review was requested but never occurred.

An MET call for hypotension was made some six hours later. It was noted that the patient had been hypotensive over an hour. The tender RUQ mass was noted again at this time. The white cell count (WCC) was now 24.7, platelets had fallen to 87, international normalised ratio (INR) 2.2, creatinine 253. The patient responded to a fluid bolus and maintained the blood pressure.

When the patient was reviewed in the Acute Surgical Unit (ASU) ward some four hours later, the systolic BP was 80mm Hg. Plans were made to correct the coagulopathy and perform a cholecystostomy. The consultant was not present at this round. A non-contrast CT performed in the early afternoon identified the dilated common duct and stones, and the results were conveyed directly to the on-call consultant. A consultant then saw the patient for the first time and diagnosed cholangitis and performed an Endoscopic Retrograde Cannulation of Pancreatic (Duct) (ERCP). At ERCP, a stent was inserted and clear bile was drained.

Postoperatively, the patient went to HDU but remained septic and, with worsening renal function, the patient became drowsy and hypotensive again and active treatment was withdrawn.

Comment

This patient had septic cholangitis which is a surgical emergency. Despite the multiple medical notes, there seems to have been minimal input at a consultant level. There are no references to discussion with any consultant and there is no evidence, apart from a CT and ERCP report, of the patient ever being seen by a consultant.

The Ambulatory Surgery Unit (ASU) team had an opportunity to undertake an intervention before the sepsis and hypotension occurred and did not intervene; discussions on an intervention were ongoing but there was no urgency to do anything. The patient was hypotensive for an hour before any intervention so there was a delay in calling an MET and this was probably what led to the eventual death.

Also, I am critical that although the patient went to a nurse specials unit after the ERCP, the medical management seemed to be largely by random after-hours doctors and the on-call medical registrar and was by a different individual each time. As a result, the medical management never really got past first-base and there was no one overseeing the overall care. The nurse special unit does not seem to have any regular medical staff coordinating the care of the patient.

When an ERCP was undertaken and clear bile drained, the sepsis continued and I am suspicious that the patient needed a cholecystostomy as well.

Despite these comments, I suspect no degree of medical input would have been able to undo the renal damage due to the delay in treatment of hypotension at the beginning of the case.

Case 12: Complications after ERCP

An elderly patient was transferred to a teaching hospital, from a metropolitan hospital, with abdominal pain and a working diagnosis of gall stone pancreatitis.

The past history included a CVA which had resulted in an expressive dysphasia and dysphagia. Other comorbidities included hypertension, cardiac arrhythmias and gout. The medications included clopidogrel, among other drugs. This was stopped but, in my opinion, contributed significantly to the final outcome.

The initial management included an ERCP undertaken by a consultant, with successful removal of common bile duct (CBD) stones and drainage of pus. A 'generous' sphincterotomy was performed. The progress of the patient postoperatively was complicated by an obvious deterioration and renal failure. This setback was discussed with the family and it was the wish of the patient not to be resuscitated if the clinical need arose.

Three days after the ERCP, there was a rising creatinine and haematuria, and there was large melaena stool and ongoing rectal bleeding through the night. There was also a coagulopathy.

A gastroscopy was carried out by a consultant the next day and the findings were bleeding from the sphincterotomy site. This was controlled by tamponade and a stent. Despite transfer to ICU, the patient continued to deteriorate and a check CT scan showed a small duodenal perforation that was managed conservatively. The renal failure also necessitated dialysis.

In spite of all this clinical treatment and support, the patient's condition continued to deteriorate and the patient died four days later.

Comment

Overall, I feel that this patient was managed well and entirely appropriately. The likelihood of a successful outcome from the liver failure and sepsis was always optimistic. From the notes, I find that the second procedure of review gastroscopy and stenting of the bleeding sphincterotomy site was timely and not unnecessarily delayed as has been suggested. The patient was probably treated more actively than their expressed wish, but it seems that the family was very supportive throughout these few last days.

I have found no cause for concern in his hospital treatment and no evidence of mismanagement, nor any adverse events.

Case 13: Earlier consultant decisions over a weekend would have been better for patient but not changed outcome

An elderly patient in a care home fell on a Saturday afternoon. The patient arrived in a peripheral hospital ED at 05:00 on the Sunday and was found to have a fractured hip. The background included dementia and hypertension. The patient previously walked with a frame. The admission full blood counts (FBC) included a Hb 80 and white blood cell (WBC) 26,000.

The patient was transferred to a teaching hospital, arriving on the orthopaedic ward at 19:00 on the Sunday. A chest x-ray (CXR) revealed a left hilar mass and probable left lower lobe infection. The patient was reviewed by the anaesthetic team shortly after arrival and it was thought that the patient was 'unlikely to be fit for OT tomorrow' and 'needs medical review' and 'needs echo'. The first orthopaedic review appears to have been at 17:00 the next day (Monday), some 22 hours after arrival on the ward. There is no written evidence that a consultant was present. Antibiotics were commenced for the chest infection.

The next orthopaedic note, made at 13:00 on the Tuesday (some 40 hours after admission), was by the intern, with no evidence of any input by the consultant. The intern wrote 'has been cancelled for theatre again today' ... 'hopefully tomorrow'. The echo was done that afternoon.

At 18:00 that day, almost exactly 48 hours after admission to the orthopaedic ward, the patient was seen by the orthogeriatric team. There is a note, for the first and only time in the entire folder, that the patient had 'known myelodysplasia' and was 'transfusion dependent'. Although not precisely stated, this appears to be a previously established diagnosis. The note stated that the mass on the CXR was 'not for further investigations due to age—likely neoplasm. Plan—review post-op'.

Some five hours after that review, an MET call was made. CPR was undertaken and appears to have lasted for some 50 minutes before being terminated.

Because of the fall in a care facility, the patient was referred to the coroner. A postmortem revealed a primary bronchogenic cancer.

Comment

The orthopaedic consultant returned the WAASM proforma marked 'terminal care' and did not complete the rest of the proforma. This does not seem consistent with the care offered this patient. If ‘for terminal care’, why was:

- the patient clearly being worked up for theatre?
- the patient sent for an echo in anticipation of her surgery?
- the patient commenced on antibiotics for a chest infection?
- a not for resuscitation (NFR) form not completed?
- CPR commenced, and then persisted for almost one hour?

There is no evidence in the notes that the patient was ever seen by the consultant orthopaedic surgeon. That may be why there appears to be a disconnect between what was written on the WAASM proforma (terminal care) and the care received. Had the consultant reviewed the patient, it is likely the patient would have been assessed as highly unlikely to survive any surgery and death inevitable. The patient could then have been offered proper terminal care.

There was a delay of over 12 hours in transfer from the care home to the peripheral hospital ED. There was a further delay of over 12 hours before the patient arrived in an orthopaedic ward. A delay of 24 hours to surgery following a hip fracture increases mortality. Such falls are a predictable event and the care home and the peripheral hospital need to review their processes to speed up such referrals. For example, why send a high-risk patient to a peripheral ED on a Sunday?

Although this patient's death was not in any way related to the apparent lack of consultant input, the lack of consultant decision making was not conducive to good terminal care.

Case 14: Delay managing abdominal sepsis contributed to death

An elderly patient who was independent and lived at home was transferred from a peripheral into a tertiary hospital for the management of a large bowel obstruction and acute renal failure. A sigmoid cancer had been managed with a palliative Hartmann procedure and postoperative adjuvant chemotherapy two years previously. Initially, the patient was under the joint care of acute medical and surgical units. A CT scan showed dilated loops of large bowel with faecal loading and a transition point at the stoma site suggestive of stomal stenosis. That was confirmed clinically. Comorbidities included hypertension, hypercholesterolaemia and venous thrombosis.

Initial management was in the form of laxatives as well as IV hydration and a nasogastric tube. A trial of dilating the stoma with a Foley catheter was performed within the first 24 hours and was partially successful. However, the patient continued to have high output of the nasogastric tube. Six days later, a colonoscopic dilatation was performed to nine millimetres and the scope passed to the hepatic flexure. The patient was transferred to the care of the colorectal unit but, despite the colonoscopic dilatation, continued to have very high nasogastric output suggestive of a small bowel obstruction.

The next day, the tight stenosis at the colostomy site was uneventfully revised. The patient was hypotensive postoperatively and progressively became oliguric and required inotropic support. Forty-eight hours later, the patient was transferred to the nurse special area. The next day, the patient was transferred to ICU. A CT scan showed thickened colon and small bowel with small bowel dilatation and free fluid in the peritoneal cavity. In ICU, the patient had invasive monitoring as well as aggressive supportive measures but continued to deteriorate to the point of becoming coagulopathic and peritonitic. Thirty-six hours later (in the late evening), a laparotomy revealed extensive adhesions with a feculent fluid and small enterotomy. Subsequently, there was prolonged slow deterioration and the patient died a week later.

Comment

This patient presented with dual pathology—a large bowel obstruction secondary to stenosis and a small bowel obstruction secondary to band adhesion. The continued high nasogastric output, despite a stoma that was functioning after the colonoscopic dilatation, was suggestive of the second pathology. An earlier CT scan could have prevented a delay in return to theatre.

Case 15: Massive upper GI bleed after total hip replacement

An elderly patient was offered an elective total hip replacement. There was a history of hypertension but no history of angina or myocardial infarction. The patient was taking long-term aspirin. A decision as to whether to stop or continue aspirin was not documented in the pre-assessment clinic notes, but the anaesthetist recorded that aspirin had been stopped nine days before surgery. The patient had no previous history of upper gastrointestinal bleeding. The pre-admission workup showed a normal coagulation profile and normal platelet numbers. The venous thromboembolism (VTE) risk assessment tool classified the patient as high risk, indicating the use of low molecular weight heparin and compression stockings. Enoxaparin 40 mg was commenced postoperatively on the evening after surgery. Compression stockings were also used. The total hip replacement operation and the anaesthetic were uneventful.

During that night the patient was stable. At some time in the early morning, the patient had discomfort in the throat and coughed but did not vomit. A small amount of coffee ground material was noted. Observations were stable, including normal oxygen saturation. There were bilateral basal crepitations. The findings were thought to represent aspiration and management ordered was suctioning, physiotherapy and a chest x-ray.

In the mid-morning, the orthopaedic team noted coffee ground vomitus on the patient's gown. The patient was then confused. Pantoprazole was commenced intravenously and an urgent consult was made to gastroenterology with a view to endoscopy.

Less than an hour later, the blood pressure dropped to 66/32, the pulse rose and oxygen saturation fell. An MET call was made. The patient had a large vomit of coffee ground fluid. Blood pressure remained low and treatment was started with IV gelofusine and boluses of aramine. ECG was initially normal. The haemoglobin had fallen from a postoperative level of 130 g/L to 91 g/L. Chest x-ray showed minor hilar changes and some collapse and consolidation at the left lower base. The working diagnosis was an upper gastrointestinal bleed, together with aspiration pneumonia. The patient progressed to needing formal cardiopulmonary resuscitation. A nasogastric tube was draining frank blood. ECG showed lateral ST depression developing. The patient did not respond to resuscitation, which was ceased after two hours.

The autopsy for the coroner found dark fluid in the stomach and small bowel but no bleeding source, no ulceration and no fresh haemorrhage. There was severe coronary artery atherosclerosis but no definite acute myocardial infarction. There was widespread bronchopneumonia.

Comment

The patient died from an adverse event following elective total hip replacement. The expected protocols were followed. Preoperative assessment did not suggest a problem should be expected. Aspirin had probably been withheld for the nine days before surgery. Enoxaparin was given according to current protocols for DVT prevention but may have been a contributing factor to bleeding and subsequent death. Such deaths need to be monitored to understand whether low molecular weight heparin therapy is reducing the overall death rate from arthroplasty. Perhaps protein pump inhibitors could be used more often on a preventive basis for patients having major surgery.

Case 16: Palliative care from outset may have been better than cystectomy

A very elderly unfit patient, ASA 3, with dementia, macular degeneration, and poor vision and hearing, did not appear to have significant cardiorespiratory risk. The patient had invasive recurrence of bladder cancer with failed radiotherapy. In these circumstances, cystectomy can be curative. If not curative, then cystectomy with ileal conduit urinary diversion is the best palliative procedure. Generally, in these circumstances, death with the bladder left in situ, is a relatively unpleasant ending.

Surgery was undertaken by two consultant urologists at a metropolitan private hospital. The patient had been worked up by a general physician. At surgery, an inoperable bladder was fixed to the pubic bone. In these circumstances, an ileal conduit urinary diversion was entirely appropriate and appears to have been relatively straightforward.

The postoperative course was complicated by altered mental state, as predicted by the attending physician. The initial postoperative management was in the ICU. It appears from the notes that the patient was transferred to the ward the first day postoperatively. There were no initial complications in the ICU. A soft diet commenced on the fourth postoperative day. The bowels opened two days later. A CT scan of the abdomen was undertaken the same day although it is not clear why—there may have been some concern about abdominal distension. The CT scan reported that the patient had an ileus.

The patient was started on total parenteral nutrition by the Intensive Care Staff the next day. This may have been because of the postoperative ileus and abdominal distension.

The patient developed rapid atrial fibrillation on the seventh postoperative day and was transferred to the Coronary Care Unit. There was some concern that this may have been secondary to sepsis, but this does not appear to have been clearly diagnosed at that time. It appears that the patient reverted to sinus rhythm with treatment in the Coronary Care Unit and was discharged from the Coronary Care Unit the same day.

The patient was re-admitted to the ICU the next day with worsening confusion and deteriorating renal function. The ICU was concerned about septicaemia and commenced with IV antibiotics and inotropic support. Ultimately, the septicaemia was probably related to a chest infection.

The sepsis was improved in ICU and the patient returned to the ward on the thirteenth postoperative day. The patient's general condition again deteriorated significantly, but it was decided not re-admit to the ICU. The patient died on the seventeenth postoperative day

Comment

This elderly demented patient failed bladder cancer management with radiotherapy, and the decision to operate was reasonable given that palliative care in these circumstances is quite a difficult strategy. None of the post-operative complications could be directly attributable to the surgery as the patient responded quite well to treatment. The ultimate decision to manage the patient palliatively was appropriate.

From the documentation, I cannot find any fault with his management. In retrospect, one could say that palliative management without surgery may have been appropriate.

Case 17: Better not to have had surgery

A very elderly, but active, patient with underlying cardiac problems presented with a mass in the upper left abdomen. Investigations revealed a large cancer at the splenic flexure, not causing any obstruction, massive haemorrhage or severe pain.

After review by the cardiology department, the patient was deemed fit for surgery. The surgery was uncomplicated, but a few days after the operation, the patient collapsed and died.

Comment

I accept that the operation was technically feasible, was performed well and the postoperative management good. However, I would not have agreed to the operation being carried out. The patient probably would have lived for another few months or even a couple of years and may have died from the heart condition before a complication from the bowel cancer or developed bowel obstruction as a terminal event.

Editorial comment

The RMO called to see the patient immediately prior to the terminal collapse, noted the weight was up 4 kg (68 to 72 kg) and that in the last 24 hours the patient was in three litres positive fluid balance. The patient had pulmonary oedema. Did fluid overload cause or create pulmonary oedema and thus a cardiac arrest in a patient with a compromised myocardium?

Case 18: Death after a tracheostomy

A non-English speaking patient in their early forties, previously well-functioning with Downs Syndrome, was admitted with a presumed diagnosis of community-acquired bilateral pneumonia. On admission, the patient was alert, orientated and communicating well *via* a translator. There were obvious respiratory difficulties which were well documented in the comments. The patient was admitted under the respiratory unit.

Some 24 hours later, the patient's breathing deteriorated. That night (day two), the RMO was called at 02:50 and consulted the on-call medical registrar; a decision was taken to give further nebulisations. An MET call was made at 04:00 for tachypnoea and low oxygen saturations. The on-call medical registrar attended the patient and advised continuation of nebulisations, as well as magnesium infusions and BIPAP/salbutamol infusion if there was no improvement.

On the third night, the RMO discussed with the medical registrar on-call the patient's increasing and erratic respiratory rate (RR) of up to 40 breaths/min. The patient was reviewed at 08:50 by a consultant and was noted to be drowsy. The RR was 40 to 45 breaths/min.

On the fourth day after admission, the RR increased to 48 to 55 breaths/min. At 22:05 on the fourth night, the patient was admitted to respiratory ICU. A note was made by the admitting doctor that no DVT prophylaxis had been given since admission. There was also a concern regarding possible pulmonary emboli and Clexane, compression stockings and calf pumps were commenced. Patient was sedated, intubated and noradrenalin commenced. Most of the blood results were abnormal including haematology, electrolytes, liver functions and acute infective markers.

On day one in ICU, the ICU review diagnosed type II respiratory failure—secondary to pneumonia, acquired respiratory distress syndrome (ARDS) and possible pulmonary embolus and sepsis (resulting in hypotension and low urine output), metabolic acidosis, hypomagnesaemia and hypocalcaemia. Efforts were instituted to correct these abnormalities. The patient continued to deteriorate and a diagnosis was made of ARDS.

The patient remained critically ill in ICU and, on the evening of day eleven, a surgical tracheostomy was performed. This was documented as a difficult procedure. There were problems oxygenating the patient after leaving the ICU, intraoperatively and postoperatively.

On the morning round of day twelve, a CXR reported 'small apical pneumothorax on right which had been noticed night before'. No further action was taken. At 11:30, the patient suddenly desaturated and a tension pneumothorax was noted, with a 32 French ICC inserted after an initial unsuccessful attempt. On day seventeen, the ICU staff made a decision that the patient was dying and treatment was withdrawn. The patient died 24 hours later.

Comment

I do not believe that there were any major adverse events in the management of this case. There are two areas of where I believe care should have been better.

1. This was a young, previously well-functioning Trisomy 21 patient who was treated in the ward for four days before admission to ICU. There were clear signs of a serious bilateral pneumonia with abnormal electrolytes, liver functions and haematology that was not responding to oxygenation, nebulisations, intravenous fluids and antibiotic treatment. On two consecutive nights there was an MET call and the RMO that was called to evaluate a deteriorating patient discussed this only with the on-call medical registrar. Yet, despite this and subsequent reviews on the morning ward rounds, there were no alarm bells that not only was this patient not improving, but inexorably deteriorating in the ward. It was only when the patient was in a critical condition was a decision made to transfer to ICU. This should have occurred much earlier.
2. There was no record of DVT or PE prophylaxis in this patient in the ward and, given the septic state and immobility, this should have been flagged immediately.

ICU care was excellent and appropriate. The only problem surrounds the transfer to the operating room for a tracheostomy and subsequent oxygen desaturations and difficulty in maintaining saturations. Although this is not uncommon or unexpected in a critically ill patient with ARDS, there should have been a higher index of suspicion for a pneumothorax following a tracheostomy in a patient on such high ventilator pressures. In fact, this was noted immediately on arrival back in ICU and written in the notes, but no action was taken until the patient deteriorated suddenly twelve hours later due to a tension pneumothorax. An emergency drain was unsuccessfully attempted followed by a successful attempt. These factors were avoidable if the pneumothorax which was detected had been acted upon earlier.

I do not believe that the pneumothorax was the root cause of this patient's demise. More careful attention to the patient's ongoing deterioration in the ward would have resulted in an earlier admission to ICU. Whether

earlier ICU admission would have changed the eventual outcome is speculative. More detailed attention to DVT and pulmonary thromboembolic prophylaxis in high-risk patients is recommended.

Case 19: Lack of senior supervision by multiple specialties and inadequate and delayed resuscitation and operative intervention in a patient with septic shock

An elderly patient presented to the emergency department during the middle of the day after being sent in by their GP. The patient had clinical jaundice and was hypotensive with a systolic blood pressure of 70 in the GP's surgery. There was no known history of medical comorbidities apart from mild treated hypertension. The patient was initially seen by an Emergency Department intern; observations at triage demonstrated tachycardia with a pulse of 111, hypotension at 60/40 and no fever. The intern obtained a two-week history of generalised malaise, nausea and decreased oral intake. There appeared to be minimal abdominal signs and the patient was treated with two litres of crystalloid and seen by the emergency department registrar within twenty minutes. Clinical diagnosis of possible obstructive jaundice was made, and a plan formed for investigations with bloods, x-rays and ultrasound scan followed by surgical review.

The surgical review did not happen for five hours. The nursing observation chart indicates the patient remained tachycardiac during this period with pulse of around 120, and hypotensive with a systolic blood pressure between 80 and 100. The patient was given four litres of crystalloid in this period. The nursing records state 'ideally needs to move to Resus Bay', but this does not appear to have been done. The patient was catheterised over four hours after presenting to the emergency department, and five hours after presentation, a record was made of multiple attempts of arterial cannulation without success. Central line insertion was performed seven hours after presentation to the emergency department.

The surgical registrar noted that the patient was coagulopathic, and acidotic with grossly deranged liver function test. Abdominal examination was recorded as being fairly normal and a diagnosis of septic shock with hypovolemia was made. Two and a half hours after being seen by the surgical registrar, the patient was transferred to the operating theatre. One and a half hours after this surgery commenced, a diagnostic laparoscopy revealed purulent fluid in the pelvis and liver cirrhosis. No source of the peritonitis was seen and the abdominal cavity was lavaged with a presumptive diagnosis of either pelvic inflammatory disease (PID) or spontaneous bacterial peritonitis. In the ICU, the patient remained profoundly septic and with multi-organ failure. After two days of failure to improve, treatment was withdrawn.

Comment

In a patient with profound sepsis and liver failure, on a background of undiagnosed probable alcohol-induced cirrhosis, the chance of survival is poor. However, in this patient, there appears to have been significant delay in adequate resuscitation and monitoring. This contributed to an already poor prognosis becoming much less likely to be survivable. Initial assessment and care in the emergency department should have been much more aggressive and expeditious, with early involvement of the ICU.

Although it is not evident in the medical records, clear comments made by the surgeon in the surgical proforma suggest serious systemic issues that significantly contributed to inadequate and delayed resuscitation and surgical intervention. The surgeon states that requests were made preoperatively for ICU, Anaesthetics and Medical preoperative resuscitation and support, all of which were refused. There was significant delay in commencing surgery once the patient had been transferred to the operating suite due to the anaesthetic registrar having difficulty obtaining arterial access. The patient was seriously unwell and rapidly deteriorating; however, the anaesthetic consultant did not attend the theatre, despite this being specifically requested by the surgical team.

Case 20: Death from pseudomembranous colitis

An elderly patient with multiple medical problems, including DM, hypertension and renal failure, had recurrent cellulitis secondary to peripheral vascular disease (PVD). The right great toe became ulcerated and the patient was admitted under the care of a renal physician pending a planned amputation for an ischaemic toe. At this time, the patient was on Timentin. The next day, before the amputation could occur, the patient developed urinary retention, catheterisation failed and insertion of a catheter was undertaken by a urologist. Some five days later, the patient had day leave.

Two days after that, the patient was given Endone, though the reason was not stated. The patient was also pyrexial. The next day, Vancomycin and Ceftriaxone were added to the antibiotics and the patient underwent the amputation. This was uneventful, as was the recovery and the next few days.

On the fifth post-operative day, clindamycin and ciprofloxicillin were added, pending discharge. However, the patient became confused and anorexic, and the abdomen was noted to be distended. This distension got worse over the next 48 hours and an AXR was undertaken. The renal physician wrote in the notes 'gaseous distension' and that the patient was 'cold and clammy'. In the early evening, the patient collapsed on the ward. Bloods at that time included a WBC over 60,000, albumin 16, urea 25.5, lactate 1, K^+ 5.8, creatine 321 and CRP 395. The intensivist involved in the resuscitation reviewed the AXR and wrote 'grossly distended large bowel loops with thickening of the transverse colon'.

Following resuscitation, a General Surgeon undertook a laparotomy. At surgery, the patient had pseudomembranous colitis. No resection was undertaken, but a transverse colostomy was raised. The patient was profoundly septic with multiple organ failure (MOF) and died in ICU the next day.

Comment

This patient's abdominal distension was secondary to a toxic colonic dilation that was secondary to pseudomembranous colitis. The patient had been on multiple antibiotics and opioid-based analgesia.

Following the collapse, it was reasonable to undertake a laparotomy. Some patients with pseudomembranous colitis who develop a toxic colon require a colectomy to save life. Indeed, given this patient's septic state, a colectomy was likely to be the only life-saving operation. It is not clear from the notes whether the surgeon did not do a colectomy because he did not appreciate that it was required or whether he judged the patient would not survive a resection.

If a colectomy was deemed too high risk, then the alternative was to do nothing. I cannot see the rationale of undertaking a loop colostomy and leaving a septic, toxic colon. I think it almost certain this patient would have died even if a colectomy, and I do not think a 'stoma only' contributed to death. But, equally, it predictably would not improve the patient's chances.

The key question is whether the diagnosis of pseudomembranous colitis could have been made earlier, in which case his antibiotics changed or, in the face of deterioration, offered an earlier colectomy. To date, Australia has been relatively free of *Clostridium difficile* pseudomembranous colitis and, unlike other countries; there is not a high index of suspicion. However, there are an increasing number of cases being detected in WA, and some of these have been after minimal, even single shot, antibiotic usage, and with multiple resistance.

The main message here is that clinicians need recognise that *C. difficile* is becoming more frequent in WA and needs to have a high index of suspicion.

Case 21: A problem with fluid balance

An elderly patient fell at home. In the ED, there was pain in the left hip and shortening in external rotation was noted. Subsequent x-rays taken illustrate a displaced intra-trochanteric fracture of the left femur. The patient was noted to have a pacemaker and was on warfarin.

Warfarin was ceased and a medical consultation was obtained regarding the pacemaker. Analgesia was continued with oxycodone and further morphine given. On the night before surgery, day four post-admission, the patient was seen by the night RMO with what was thought to be chest pain. It was felt not to be ischaemic chest pain, but a troponin was undertaken. The following morning, the patient was noted to be comfortable and afebrile with normal observations but in atrial fibrillation. The patient was noted to have an increased respiratory rate and basal crepitations.

Chest x-rays showed a cardiomegaly with a distal oedema. An echocardiogram was performed which showed a mildly dilated left ventricle and right ventricle, severe bi-atrial enlargement, mitral regurgitation and tricuspid regurgitation. The electrolytes showed that the sodium had dropped from the initial level of 135 on admission to 122 on day four. The patient was taken to theatre on day five and underwent an internal fixation of the fracture of the proximal femur.

The postoperative course was stormy, and the patient was reviewed on a number of occasions by resident medical staff. A MET call was made the following morning and the patient was submitted to cardiopulmonary resuscitation for fifteen minutes. No rhythm could be restored, and the patient was subsequently declared deceased.

Comment

The significant issue that needs to be mentioned is the delay in proceeding to surgery but, reading the notes, it is apparent that the medical issues were overriding, which prevented the early fixation of the fracture. The hyponatremia may not have been anticipated and perhaps was a factor that could have been identified earlier in this patient.

The other issue of concern was that this patient was not admitted to a High Dependency Unit or Intensive Care Unit post-surgery which perhaps could have delayed or prevented further demise as this patient had major comorbidities. I note that the patient was also hyponatremia and I am not certain whether this was adequately treated before being submitted to surgery.

I have no concerns with the surgical techniques used or with conduct of the surgical procedure.

Case 22: Delay in recognising and managing ileostomy closure leads to death

A middle-aged patient had a previous low anterior resection for rectal cancer. The patient was known to have metastases in the liver and lungs. This was an elective admission for reversal of de-functioning ileostomy. The procedure was carried out on the day of admission.

For the first three postoperative days, the patient was febrile, in considerable pain, and had progressively increasing abdominal distension. On the fourth postoperative day, the patient was commenced on antibiotics and the temperature settled somewhat, but the distension persisted. Although I could find no record in the notes, I presume someone did a PR examination and it was discovered that the patient had a severe stricture of the rectal anastomosis. The patient was taken to theatre for dilatation.

Despite this procedure, the patient continued to have considerable pain and the distension persisted. On the evening of the eighth postoperative day, the nursing staff commented that the bag which was sited over his ileostomy site had become distended with gas. The following morning an x-ray revealed the presence of a pneumoperitoneum. A decision was made to continue conservative treatment. The patient's condition did not improve significantly over the ensuing days and on the fifteenth postoperative day, the patient was transferred to a teaching hospital.

At the teaching hospital, it was recognised that the patient was seriously ill and needed an urgent laparotomy, albeit high-risk. There had been a leak from the ileostomy closure, presumably secondary to back pressure from the stricture. The subsequent operation took over three hours, during which time the patient continued to deteriorate. The patient was transferred to ICU postoperatively but died several hours later.

Comment:

I realise that I have the ‘wisdom’ of hindsight in reviewing this case, but be that as it may, I think there are some serious issues for consideration.

Firstly, it would appear that this man had not had a rectal examination prior to his procedure. I would have thought that this would have been routine, not only to assess the anastomosis but also as a routine check for possible recurrence.

Secondly, despite the very unsatisfactory postoperative course, I could not find any attempt at a diagnosis; in particular, the possibility of a leak at the ileostomy closure did not appear to be considered.

Finally, when irrefutable evidence of the presence of a leak was found, a decision was made to continue with conservative management.

I feel all this could have been avoided. If intervention had been initiated when the leak became obvious, the situation may have been salvaged.

Case 23: Death from arterial haemorrhage after Prasugrel prescribed following angiogram

A middle-aged patient underwent an angiogram in a private hospital. The patient had experienced at least two acute coronary symptoms (ACS) episodes within the last year so the indications seem appropriate. Prior to the angiogram, the patient had been on aspirin and clopidogrel. Two stents were inserted. On discharge, the Clopidogrel was changed to Prasugrel and Clexane added. The aspirin usage post-discharge is not clear.

The patient was seen by the cardiologist the next day and had a small groin haematoma. An ultrasound scan was not undertaken. Although a CT was considered, the patient was stable and it was not undertaken. The patient attended the GP a week later complaining of abdominal pain and swelling. The GP managed this as a groin infection. A family member staying with the patient found the patient pale and sweaty the next morning and called an ambulance. The patient was taken to a non-teaching hospital. On admission, bloods included Hb 50, K+ 7.4, INR 1.4 and AAPT 99. The patient had a hypovolemic arrest. After resuscitation, the patient was transferred to a teaching hospital ICU.

After further resuscitation, the patient was taken to theatre and a vascular surgeon repaired a hole in the left distal external iliac artery where there was a large pelvic haematoma. In ICU, the patient developed MOF and required dialysis. The following day, a general surgeon undertook a laparotomy for presumed ischaemic colitis and found ischaemic, patchy necrosis of the ileum. A resection and ileostomy was performed. The MOF continued to worsen, the lactate rose and inotropic demands increased. A second laparotomy the next day confirmed the clinical impression of further ischaemic bowel to the extent it was incompatible with life and the operation terminated. The patient died a short time later.

Comment

I preface the following remarks by stating I am a surgeon, not a cardiologist. The pivotal randomised trial for prasugrel was TRITON-TIMI 38. This found that bleeding complications after percutaneous coronary intervention (PCI) in patients on Prasugrel was about three times that of Clopidogrel. My limited literature search found a substantial number of publications pertaining to this difference. Most of the literature relates to patients having a PCI for ACS and then being prescribed Prasugrel. It not clear how many, if any, were (as here) already on anti-platelet medication at the time of the PCI.

The 'Black Box' in the Prasugrel PDI published by Eli Lilly notes the compounding effect of '*concomitant use of medications that increase the risk of bleeding*'. The timing in this patient was such that, in effect, there was dual anti-platelet therapy with the start of the Prasugrel and the tail of the Clopidogrel (and arguably triple anti-platelet therapy with Aspirin), to which was added Clexane. The PDI also states '*Suspect bleeding in any patient who is hypotensive and has recently undergone coronary angiography, PCI, CABG, or other surgical procedures even if the patient does not have overt signs of bleeding'*.

The management by the vascular and general surgeons was quite appropriate and uncomplicated. There are a number of issues around the PCI that would appear to merit legitimate enquiry.

1. Was the replacement of Clopidogrel by Prasugrel appropriate given the pre-existing anti-platelet effect of the Clopidogrel (and perhaps aspirin)?
2. Was the addition of Clexane appropriate?
3. Should the cardiologist been more suspicious and undertaken a scan having found a haematoma in the groin the day after the PCI?
4. Should the GP have been more suspicious? An infection after a PCI would be rare and the GP would have been aware that the patient was on anti-platelet drugs. So, to my mind, it is not unreasonable that the GP should have at least entertained that the symptoms were secondary to a haematoma. That stated, this is a view expressed with the advantage of hindsight and may be a bit harsh on the GP given that Prasugrel is a newish drug and normally prescribed by a specialist in specific circumstances.
5. That raises the question as to what information the GP was given about the anti-platelet medication and whether this was communicated to the GP in a timely manner such that he or she would have had it at the time of review a week later.
6. What information was given to the patient?

An increasing number of patients are being prescribed ever more potent drugs that impact on thrombogenesis. It is incumbent on those who prescribe the drugs in question to ensure that patients and other carers understand the likely complications of drugs they may not be familiar with.

It is difficult to escape the conclusion that this patient could, and probably should, have been managed differently. As such, this was a potentially avoidable death.