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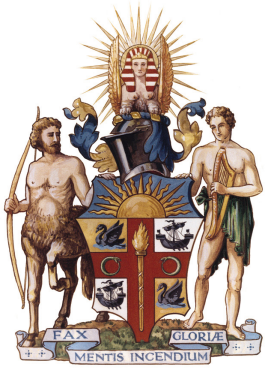
The Western Australian Safety and Quality of Surgical Care Project

Western Australian Audit of Surgical Mortality

at the Royal Australasian College of Surgeons

WAASM



Case Note Reviews

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Western Australian Audit of Surgical Mortality

CASE NOTE REVIEWS

All surgical proformas returned to WAASM are reviewed by a first-line assessor. Where there is an educational point to be highlighted or there appears to be factors that warrant further investigation, then a second-line assessment is made. A consultant from a relevant specialty in a different hospital carries out the review. Second-line assessments are based on information provided by the surgeon who completed the surgical proforma, and on the case notes. These reports undergo minor editing if necessary, and are de-identified by removing all references to names, hospitals and dates. A selection of the case note reviews, some of which have been edited further to decrease their size, are combined into a booklet and sent to all surgeons as educational feedback several times per year.

Correspondence regarding individual cases presented here is not possible. WAASM welcomes any comments regarding general points made in these assessments (waasm@cyllene.uwa.edu.au).

Table of Contents

TECHNICAL PROBLEMS

Post-Op Bleeding Starts Cascade To Death

Summary

A fit 81 year old lady was admitted as an emergency to a teaching hospital, with abdominal pain and distension. There was a history of some alteration of mental state, night sweats, and respiratory difficulties. Investigations in the Emergency Department confirmed the presence of distended colon (a pseudo-obstruction) and it was thought that there was a high likelihood of ischaemic bowel. Surgery was undertaken late that morning following a CT scan.

At operation the colon was found to be grossly distended, and there were changes in the caecum suggestive of ischaemia and impending perforation. There was some murky fluid in the peritoneal cavity, but no obvious perforation was noted. She was treated with a sub-total colectomy with a stapled ileosigmoid anastomosis. She was admitted to the ICU with atrial fibrillation and acute respiratory failure. Within 24 hours she was noted to be distended and tender, and it was difficult to maintain her haemoglobin level. There was evidence of a coagulopathy, with raised INR and APTT levels.

As blood loss seemed to be a significant problem, she was returned to theatre for a laparotomy, washout and haemostasis. At repeat laparotomy it was found that she had a bleed from the sigmoid mesentery, and there was also evidence of a rotation of the small bowel mesentery. This was corrected with a mid-jejunal transection and anastomosis. The bleeding in the sigmoid mesentery was ligated.

Following the second laparotomy the patient remained unwell, with ongoing sepsis requiring ventilation and inotropes. Over the next three days she did not improve, gradually requiring increased inotropes and ventilatory support. As there was a possibility ofongoing intra-abdominal sepsis, a further laparotomy was recommended. This was done five days after admission, but there was no evidence of any significant intraperitoneal sepsis nor any obvious problem with bowel viability. A tracheostomy was performed for ongoing ventilatory support. In the following three days she failed to improve and eventually died of multiple problems including the inability to maintain circulation, and respiratory failure. Swabs taken from her lung expectoration prior to death confirmed active tuberculosis.

Comment

I do not feel there was any major adverse event which contributed to the ultimate outcome. The patient presented with a severe problem with a high mortality risk: ischaemic bowel related to a form of obstruction. The initial sub-total colectomy with ileosigmoid anastomosis was totally appropriate. The need to return to theatre for the second operation due to bleeding was unfortunate, and most likely related to an underlying coagulopathy which was developing at or about the time of surgery and did not improve despite measures undertaken in the ICU.

The second operation deserves some comment. Firstly, the bleeding from the sigmoid mesentery was not related to the finding of the twisted mesentery involving the jejunum and proximal small gut. The use of fine Vicryl sutures (2.0 and 3.0 noted in the operation record) might have contributed, as these are often difficult to tie in an acute oedematous mesentery, and one of these may have slipped off leading to the ongoing bleeding for the first 24 hours after surgery. When carrying out an ileosigmoid anastomosis one has to always be careful to make sure

that the small bowel mesentery is correctly orientated, as it often has a tendency to twist the other way, and this is obviously what happened. Fortunately, the twist was not severe, and I do not believe led to the bleeding in the opposite mesentery (sigmoid) nor did it obviously compromise the integrity of the small bowel, as judged by the viability of the anastomosis. The decision to correct this rotation by a jejunal resection was a little unorthodox, and may have been a "little too much" in the circumstances of taking the patient back to theatre for bleeding in the setting of critical illness. If everything was viable it may well have been reasonable to leave this alone.

Overall, I do not believe in any circumstances the end result would have been any different. The patient presented with a critical condition (bowel infarction), and was treated appropriately. She was given extensive critical care in the ICU, but unfortunately due to the severity of the presenting condition, in addition to an underlying chest problem (subsequently found to be tuberculosis), and general development of septicaemia, led to her inevitable demise.

Death from Technical Errors in High Risk Patient

Summary

A 71 year old lady with myelodysplasia (treated with prednisolone and chlorambucil) was admitted to a regional hospital with abdominal pain and a UTI, and was found to have splenomegaly, extensive abdominal lymphadenopathy and anaemia. The chlorambucil was ceased and after consultation with a haematologist and pre-operative transfusion and appropriate vaccinations, a splenectomy was performed to control her hemolytic anaemia.

When a splenectomy was performed two weeks later a large tumour was found in the hilum of the spleen. The lymph nodes and bone marrow were also biopsied. Blood loss was recorded as 1.5 litres during the procedure. The following day she was unwell and gastric contents were identified from the splenic bed drain. She was therefore returned to theatre on the following day where a perforation of the greater curve of the stomach was identified, biopsied, and oversewn and the repair reinforced with omentum. Histology of the perforation site showed only acute ulceration without evidence of lymphoma, and histology from the resected spleen confirmed a large cell malignancy of histolytic sarcoma/true histolytic lymphoma.

She remained septic requiring ventilation and inotropic support post-operatively and was transferred to a teaching hospital by RFDS. Over the next five days she made good progress and was discharged to the ward after being extubated. She commenced oral intake on the 6th day post-operatively and was improving steadily until early in the morning of the 8th day post-operatively when she became acutely short of breath, hypotensive and tachycardic. An urgent CT scan was arranged and this showed a fluid collection in the left anterior peri-renal space with free intra-abdominal gas. Later that evening she was taken to theatre and a 3rd laparotomy revealed a perforation in the transverse colon just proximal to the splenic flexure at the site of a vicryl ligature. The surgeon observed that there was contained contamination in the left upper quadrant, that the bowel was well perfused, but the region of the transverse colon was by then quite rigid and the surgeon did not feel that a resection and primary anastomosis was appropriate, and opted therefore for an oversewing of the perforation and defunctioning of the bowel proximally with a loop ileostomy.

She was returned to ICU with initially some improvement requiring low dose inotropes, but over the next few days she developed a coagulopathy with her INR reaching 4 on the third day after the 3rd laparotomy, and this was only partially corrected with FFP, cryoprecipitate and vitamin K. There was further deterioration in her renal function and she required increasing doses of inotropes. On the same day, a small amount of blood was identified in the gastric tube and the following day this had increased and she developed melena. Endoscopy on the 4th post-operative day revealed brisk oozing from the site of the greater curve ulcer repair which was treated with adrenaline injection. Unfortunately, the bleeding increased and a second endoscopy was performed the following day where a large amount of blood was found in the stomach. She was taken to theatre later that morning where it was found that the stomach and small intestines were oedematous and poorly perfused. She was generally coagulapathic with contact bleeding throughout her abdomen. However, there was no re-accumulation of a septic collection. The stomach was opened but there was no isolated point of haemorrhage, and by then the whole gastric mucosa was oozing blood. The laparotomy was then abandoned, and despite further transfusion and administration of inotropes her blood pressure fell and she died.

Comment

This lady had significant pre-operative comorbidity of hematological malignancy, as well as immunosuppressant and steroid therapy. The indications for a splenectomy were appropriate and the spleen was moderately enlarged at 642 grams when removed. Evidently some damage to the greater curve of the stomach was sustained during the splenectomy which resulted in a perforation identified the following day. At the operation to repair this, an ulcer was identified at the site of perforation but histologically this showed no evidence of malignancy. An appropriate technique was used to repair this perforation by oversewing and an omental patch, but it seems likely that in the process of mobilising the omentum to produce this, that a ligature was placed too close to the colonic wall and this subsequently caused ischaemia of the colonic wall and a delayed perforation. Again this perforation was identified and operated on expeditiously, and the management of this second perforation was appropriate although other options at the time would have included exteriorization of the perforation as a loop colostomy or resection and primary anastomosis with or without a covering ileostomy. There was no evidence of re-perforation at her 4th and final laparotomy, and I would conclude that the surgical management of this perforation was apposite.

The final chain of events leading to her death included ongoing sepsis in a patient already primed by previous septic events who then required increasing doses of inotropes and became coagulapathic and probably started bleeding again from ulceration of her stomach. I believe that appropriate attempts were made to try and reverse this sequence of events, to no avail.

Unfortunately, it must be concluded that two technical errors occurred which led to the perforation in the stomach wall and later to a delayed perforation of the transverse colon. There is always a comfortable level of tolerance which healthy tissue allows in the placement of suture or ligation close to their wall. Unfortunately, this comfort margin would have been significantly reduced, most likely from her steroid use and atrophy with age, and perforation of the intestinal wall occurred as a result of a ligature placed too close and causing ischaemic damage. I doubt whether any other surgical manoeuvre would have controlled the gastric haemorrhage which was the ultimate cause of her death.

Inadequate Large Bowel Surgery

Summary

This 84 year old gentleman was admitted for a left hemicolectomy after a colonoscopy showed a carcinoma of the splenic flexure. Past medical history included Parkinson's disease, myocardial infarction and back pain. He had a TURP and multiple joint replacements in the past.

At laparotomy a transverse colon carcinoma was identified. A segmental resection was performed. The anastomosis was made using a two-layered hand-sewn technique. Histology was consistent with a Dukes A carcinoma.

Post-operatively, the patient appeared to be recovering well, except for signs of confusion. On post-operative day 7, the patient was noted to be unwell and had abdominal distension. An abdominal x-ray showed pneumo-peritoneum. At laparotomy, a perforation of a descending colon diverticulum was identified. This was oversewn with silk. A 22 French catheter caecostomy tube was inserted. His second post-operative period was complicated by atrial fibrillation and periods of low urinary output. His general condition deteriorated over the course of the next few weeks and died 28 days after admission.

Comment

This case highlights a few issues.

With this gentleman's pre-morbid condition, a segmental colectomy may have had merits, but I suspect that in most situations either an extended right or left hemicolectomy would be the operation of choice. This would be more oncologically correct. It would also eliminate the possibility of vascular insufficiency when the proximal and distal parts of the transverse colon are anastomosed. The marginal vasculature can be compromised in the elderly especially if the middle colic vessels are ligated.

It is unfortunate that this gentleman developed a perforation of the descending colon diverticulum post-operatively. I was unable to identify from the operating notes if the affected part of the descending colon was inflamed and thickened. The extent of peritoneum contamination was not mentioned. The mortality rate from faecal peritonitis in this age group is high, regardless of surgery. However, to give this gentleman the best chance of survival a Hartman's type procedure with resection of the perforated diverticulum ± anastomosis would certainly be the safest. Oversewing the perforation, especially if the colon was inflamed, is not an ideal situation, and silk may not be the suture of choice. This is more so if there is evidence of faecal peritonitis.

This gentleman remained quite confused after his second procedure. He never quite got back on to a diet. Perhaps this is because of his gradual deterioration. Whether a referral to a tertiary institution and use of TPN would have made any difference is difficult to tell. I suspect not. Nevertheless, I was not able to tell from the inpatient notes if this was considered.

I did not see any contra-indications to the use of heparin for DVT and PE prophylaxis in this patient. Heparin was actively withheld by the surgeon in this case. Most of the documentation was done by the nursing staff . The record keeping from the surgical staff is lacking, especially in light of the serious nature of this patient's condition.

In summary, this gentleman had an unexpected complication of perforation of a descending colon diverticulum after segmental colectomy. In order to give this gentleman the best chance of recovery, a Hartman's type procedure would be preferable to simple oversewing. However, given his age, premorbid condition and the unfortunate complication, it probably would have made no difference to the eventual outcome of the situation. As no autopsy was carried out, the actual cause of death is not known.

Colonic Interposition May Have Resulted in a Different Outcome

Summary

This patient was a non-smoking, non-insulin dependent diabetic male aged 51 years admitted for staging laparoscopy and resection (if appropriate) of an adenocarcinoma of the gastric cardia. Pre-operative tumour staging was T3 N1. Both his parents had cerebrovascular accidents at young ages.

A registrar commenced the surgery with the consultant in the operating suite. Inadvertent damage to the right gastric artery (requiring ligation of the artery) occurred before the consultant joined the operation. This vascular injury resulted in a shortened gastric conduit. Consideration was given at this stage to a total gastrectomy, but the small bowel mesentery was very short, creating difficulties with the alternative of a Roux en Y. It was decided to proceed with a trans abdominal proximal gastrectomy using a shortened gastric tube, which was considered viable. Proximal tumour clearance was incomplete on the resected specimen.

Subsequent leakage from the lesser curve of the gastric tube resulted in sepsis and multi-organ failure. Management included three further laparotomies, bilateral thoracotomies, insertion of a Cameron tube and tracheostomy. This resulted in control of sepsis but left the patient with multiple fistulas. A presumed brain stem infarct resulted in coma and a decision was made, in conjunction with the patient's family, to withdraw active treatment. The patient died later that same day.

Comment

The injury to the right gastric artery was the initiating event to a series of complications that resulted in this patient's death. Subsequent to the injury it was revealed that the senior registrar involved had been on duty the preceding night and was operating whilst tired.

A number of other issues are of note. The most important of these is that of incomplete tumour clearance at the time of the original operation. Histology from the original operation revealed incomplete tumour clearance at the proximal end of the resected specimen. Extended resection was not undertaken, presumably because of the dilemma created by the short gastric tube precluding an Ivor Lewis oesophagectomy. The operation notes from the original operation mentioned that the duodenum was Kocherised. However, in the notes relating to the third laparotomy, it states that the right hemicolon was mobilised and the duodenum fully Kocherised to further mobilise the gastric remnant proximally. This would suggest that further mobilisation could have been undertaken at the first operation, thus allowing a more proximal oesophageal resection to ensure tumour clearance. However, this would not have prevented the subsequent leak.

Colonic interposition, however, would have allowed more satisfactory proximal clearance and at the same time it could have also had the unintended effect of preventing the ischaemic leak from the compromised gastric tube by allowing a more radical gastric resection. I understand that the gastric tube was considered viable at the initial operation and I am therefore not arguing for colonic interposition on the grounds of gastric ischaemia in this case. It is unclear from the notes whether colonic bowel prep was performed pre-operatively. I believe that all potential oesophagogastrectomy patients should undertake colonic prep pre-operatively.

Another issue identified was the fact that although prophylactic subcutaneous heparin was administered, this was not commenced until after the patient's first operation. I could not determine from the notes whether calf compression was employed during surgery or whether compression stockings were used peri-operatively.

Minor errors in documentation were also identified, including the incorrect date on the original operation report.

DELAY

Delay Treating Faecal Peritonitis Leads to Death

Summary

This elderly woman with a past history of obesity, collapses and ischaemic colitis was referred to hospital with abdominal pain occurring on a background of constipation. She was noted to be febrile on admission by the junior staff, with tachycardia and generalised abdominal tenderness, guarding and rebound. She required a total of 20 mg IV morphine over 15 minutes for pain relief.

She was assessed by the gastroenterology consultant shortly after admission and surgical review was sought. The surgeon on call was initially not contactable, but did review the patient 5 hours after admission. Conservative management was decided, but she became shocked 2 hours later. The surgeon was not contactable again. Within 12 hours of admission, she was in extremis and oliguric. She was then reviewed by the surgeon three hours later, and a laparotomy was performed after another 3 hours.

The operative findings were of stercoral perforation with generalised faecal peritonitis. Hartmann's procedure was performed. The patient died in ICU 30 hours post-operatively, despite adequate care.

Comment

There are several issues here. One is the lack of availability of the on-call surgeon, particularly after midnight when the patient's condition deteriorated. She appeared to require immediate surgery.

The patient's assessment on admission indicated generalised peritonitis, and yet conservative management was undertaken. She was considered high risk due to obesity and ischaemic colitis, despite coronary angiography showing normal left ventricular function two months prior to admission.

Faecal peritonitis has a high mortality, but the outcome may have been different if earlier surgical intervention occurred.

Delay Contributes to Fatal Complications of ERCP

Summary

A 68 year old lady was admitted to hospital with a mild episode of acute cholecystitis. This settled rapidly with intravenous antibiotics and analgesia. The patient was listed for an elective laparoscopic cholecystectomy that was performed eight weeks later at a district hospital. Considerable technical difficulty was encountered at the laparoscopic cholecystectomy as there was an impacted stone in Hartmann's pouch which was part of an inflammatory mass adherent to the wall of the common bile duct. The surgeon could not identify the cystic duct and performed a 25 gauge needle operative cholangiogram which outlined a normal biliary tree and free drainage of contrast to the duodenum without retained stones. The surgeon inserted a right hypochondrial redivac drain and

transferred the patient to a tertiary referral hospital for ERCP.

On the second day she was reviewed by the surgeon who noted bile in the drain and felt the ERCP should go ahead. The patient waited for eight days in the tertiary referral hospital before ERCP was performed. The ERCP was technically difficult. The papilla was noted to be on the anterior wall of a duodenal diverticulum and, despite cutdown, the common duct could not be cannulated. No contrast appears to have been used. Fluoroscopy was not used. The endoscopist recommended a repeat ERCP the following week when the oedema settled.

After the ERCP, the patient became unwell with abdominal pain and nausea. Although her vital signs remained stable her serum amylase was elevated, her white cell count became elevated and she developed a thrombocytosis. A diagnosis of post ERCP acute pancreatitis was made. Five days later a second ERCP was attempted by a different operator. This operator injected contrast into the site of the previous cutdown and found the contrast passed extra-duodenally into a cavity. He queried the possibility of a contained duodenal leak, but this was not confirmed conclusively by CT scan. The patient was discharged home 48 hours later.

She was readmitted again five days later with diarrhoea, vomiting and a faeculent discharge from the abdominal drain. At this stage repeat ultrasound and sinogram along the drain tube were performed. A CT scan showed the development of extensive retro-peritoneal fluid collections which did appear to extend around the pancreas and extended to the site of the right upper quadrant drain. The pancreas itself demonstrated normal contrast enhancement, so no evidence of necrosis or haemorrhage was identified. The abdominal ultrasound added no further information and a sinogram failed because of contrast leak to the abdominal wall. A spiral CT was performed and again noted peri-duodenal and pancreatic collections and was reported as being consistent with resolving pancreatitis. Drain swabs grew skin commensals only. The patient was discharged home on six days of trimethoprim for a UTI.

The patient was readmitted eight days later because of a deteriorating general condition. Four days after admission the patient had an abdominal ultrasound which was uninformative and was booked for another CT scan. Before it could be done, the patient developed septic shock and CT scan was done as an emergency (six days after admission). It showed the presence of extensive retro-peritoneal gas and gas extending to the abdominal wall consistent with diffuse intra-abdominal sepsis. The patient had an emergency laparotomy and necrosectomy with resection of a necrotic perforated transverse colon and Hartmann's procedure. The patient's septic state failed to respond to surgical toilet and the patient developed disseminated intravascular coagulopathy with profound haemorrhagic shock. She was returned to theatre for a second look laparotomy but succumbed in the operating theatre.

Comment

It is easy, in retrospect, to postulate that things could have been done differently in this case. I agree with the first reviewer's assessment that the original ERCP was probably not necessary. In the presence of a normal operative cholangiogram with free drainage of contrast into the duodenum in a pain-free patient with normal liver function tests, further conservative treatment could have been undertaken. However, many surgeons faced with this problem would indeed order an ERCP, and had the ERCP been performed without complication this speculation would not arise.

It is unclear why the endoscopist who performed the first ERCP was not aware that the duodenum had perforated, or why contrast was not injected into the site of the sphincterotomy cutdown. The patient's subsequent course strongly suggests duodenal perforation did occur. Subsequently, ERCP was repeated five days later and with the injection of contrast the presence of a localized duodenal perforation was diagnosed. On readmission five days later the faeculent discharge from the drain tube suggests that intestinal perforation, rather than pancreatitis was the underlying problem. CT scanning on this occasion failed to show free intra-peritoneal air. It did show that the pancreas was not necrotic and that there was extensive free retro-peritoneal fluid. The discharge with leukocytosis and thrombocytosis and a normal amylase should have raised an index of suspicion that sepsis might develop. The patient was given methylene blue orally in an attempt to prove perforation. However, the nursing notes document that she vomited up most of the methylene blue, so this relatively unreliable test would be made even more unreliable. This reviewer feels a Gastrograffin meal would have been more sensitive than methylene blue ingestion, and Gastrograffin can be detected in the urine in minute quantities in the presence of intestinal perforation. The fact that a discharge that looked and smelled faeculent was reported as growing only *Staph aureus* and skin commensals is a worry. The result focused attention on the *Klebsiella* UTI as a cause for sepsis and the trimethoprim prescribed for this may have masked the underlying condition.

The patient's final admission raises significant issues in relation to continuity and quality of care. The patient was readmitted to the tertiary institution eight days later, but did not have an ultrasound until four days after that, and did not have a CT scan for six days after admission. That was performed as an emergency when she was already in septic shock. The medical progress notes for this admission are unsatisfactory, not clearly signed and demonstrate no clear plan for the investigation of this patient. It is unclear as to why an ultrasound was not done until four days after admission and why the patient was not reviewed by the surgeon in charge until after she had gone into septic shock. The nursing notes give some clue in that they note on the night of the patient's admission that no admission notes had been done by the resident medical officer. They also note that no management plan had been drawn up and that the RMO had omitted to write up the medication chart. Two days later they queried that an abdominal ultrasound

had not been booked as yet and that the patient was for psychiatric review. All of this suggests that the resident medical officer in charge and the registrar in charge failed to appreciate the severity of the patient's condition. It is hard to believe that the extensive developing gas gangrene extending to the site of the abdominal drain would not have been detectable at this stage. The white cell count had risen since discharge and rose further after admission.

System errors have contributed significantly to this outcome. The notation system at this hospital is unsatisfactory. Investigations are kept separate from the relevant admissions and are filed without editing or scrutiny so that often multiple copies of the same investigation are in the charts. Nursing progress notes are filed separately from the medical progress notes. Nursing progress notes are always a valuable adjunct to patient care, and in many hospitals are combined with the medical notes to make a more complete picture instantly available.

The workload of the RMO and registrar involved in the management for this admission should be reviewed to see if fatigue was a contributing factor in delayed diagnosis. It does appear that the personnel changed between the patient's admissions and it may be that the new resident staff were insufficiently experienced to adequately manage this patient. If there is a difference in the experience in resident medical staff at change over time, it is recommended that the consultant be made aware of this so that more careful supervision of resident medical staff occurs at change over times. The consultant note says that a CT scan was requested but refused and an ultrasound offered instead. If a CT scan was requested with an appropriate degree of urgency by the registrar concerned or by the consultant himself, it should have been acceded to and this communication process should be examined.

At a time when fast abdominal ultrasound is available in Accident and Emergency Departments for the screening of abdominal trauma, the use of a non-invasive tests such as ultrasound in patients with abdominal pain should be recommended to RMOs within the first 24 hours of hospital admission, but it must be added that ultrasound has been singularly unhelpful in this case and a reassessment of the ultrasound services may be worthwhile. The RMO note two days before her death stated "ultrasound not satisfactory, patient moving about too much". The significance of this may not have been recognized at the time.

Finally, the progress notes seem to indicate that during three hospital admissions totalling 28 days, the patient was seen three times by the surgeon in charge, prior to the development of her septic shock. If she was seen more frequently then it should be documented. If that does indeed reflect the frequency of the visits it may well be worth recommending more frequent specialist ward rounds on this unit. It is worth noting that on the occasions when the patient was admitted through the Accident and Emergency Department, the patient appears to have her most thorough assessments and clear documentation performed by the experienced staff in that department. A further failsafe mechanism would be to ensure direct booked admissions of post-operative complications are assessed in the Accident and Emergency Department before admission to the wards.

Time Delay to Receiving Tertiary Level Care Critical in Outcome from Hypovolaemic Shock

Summary

An elderly female with a past history of chronic back pain, depression and emphysema was involved in a two-vehicle motor vehicle crash. She sustained a driver's side T-bone impact. St John Ambulance observations recorded a pulse of 100, BP 90/-, GCS 3. Observations 20 minutes later were P140, BP 90, GCS 3. The patient arrived at a peripheral hospital 11 minutes after the last observations, and her initial observations in hospital were P135, BP 80/-, GCS 8 (El, V1, M6).

Injuries noted were a scalp laceration, bruising to the right side of the neck, seat belt bruising and PV blood loss. A urinary catheter was passed and drained frank blood. CXR were normal. A pelvic X-ray revealed fractures of the right superior and inferior pubic rami. GCS improved to 12 after 23 minutes from admission, as the BP increased to 113/-. Four litres of crystalloid were infused, along with four units of uncrossed O negative blood. The patient required transfer to a tertiary hospital, and departed one hour and 24 minutes after admission, with GCS 11, Pulse 120, and BP 80/-. She arrived at the tertiary hospital 22 minutes later with a pulse of 90 and unrecordable BP. She was intubated, ventilated, had a CVC, arterial line and abdominal ultrasound, as well as noradrenaline infusion. The BP was recorded as 72/48 almost two hours after arrival.

She was taken to the CT scanner two hours and 48 minutes after arrival at the tertiary hospital, and then transferred to theatre. She became bradycardic, then asystolic and died 15 minutes later.

Areas for Consideration

1. A period of 45 minutes elapsed from the time of the incident to arrival at the peripheral hospital. The patient had established hypovolaemic shock. From this point, tertiary level care consisting of ICU with or without theatre was indicated. A further 1 hour elapsed before arriving at a tertiary hospital. This may have been a critical factor in determining the final outcome.

2. Glasgow Coma Score on arrival at the peripheral hospital was sufficient to warrant stabilisation of the airway with intubation and ventilation. A basic principle of transport of the critically ill is to predict adverse events during the transport period and stabilise in anticipation of those events occurring. That the patient required intubation and ventilation on arrival to the tertiary hospital would indicate this principle was not adhered to. The major determinants of outcome from head injury are:

    a) maintaining systolic BP> 90

    b) maintaining oxygen saturation> 90%

Optimal stabilisation of A-B-C (which includes intubation) is necessary to ensure these thresholds are not breached.

3. From the time of arrival at the tertiary hospital, the prognosis was poor. The rationale for transfer of a critically ill patient to the CT scanner is not clear and contradicts the teaching of courses such as EMST/ATLS. A CT scanner is not an appropriate environment for optimal management of a patient with more than Grade III hypovolaemic shock.

Comments

There was a delay of just under five hours from the time of the incident to entering an operating theatre. Early operative intervention was the only intervention that may have altered the outcome in this case.

The debate between "stay and play" or "load and go" is relevant both in the pre-hospital setting as well as the hospital setting. My belief is that this patient's care was compromised by remaining too long in a facility that could not offer definitive surgical or intensive care treatment. A protocol may be warranted that requires all patients with Class III shock or greater to receive only A-B-C stabilisation prior to on-transfer to a centre with theatre and ICU facilities.

The outcome from trauma is time dependant. This patient, being in Class III hypovolaemic shock (>30% of circulating blood volume) on arrival at the peripheral hospital, was in need of urgent definitive care to stabilise internal or external bleeding. It is therefore difficult to justify a delay of just under five hours from the time of the incident to the attempt to provide the definitive procedure to control bleeding.

However, the final outcome for this patient may not have been altered, taking into account age, mechanism of injury and injury pattern. Aggressive early intervention may have merely resulted in death occurring in the days to weeks following admission. The lesson to be learned is for the patient who will benefit from aggressive early intervention and have a better outcome as a result.

RESUSCITATION

Hypotension Following Trauma in an Elderly Man with a Pacemaker Leaves No Margin for Error

Summary

A man in his late 80s with a cardiac pacemaker and peripheral vascular disease was struck by a car at approximately 30 km/hr while in his motorised wheelchair and thrown on to a curb. He was alert with a GCS of 15 and a BP of 195 when collected by the ambulance.

At initial examination in the Emergency Department 70 minutes later, he was alert and examination of his skeletal system was reported as normal. An IV line was inserted and he received 2 litres of fluid promptly. He left the department for skeletal survey 20 minutes after arrival. He then had a CT scan of his skull, neck, chest and pelvis. Injuries included multiple rib fractures on the left side, a comminuted fracture of the left iliac wing with a moderate iliac wall haematoma, fractures of the left pubic rami, and fractures of the lumbar spine.

Intravenous fluid therapy was the mainstay of management, initially based on vital signs, and subsequently on the monitoring of urinary output. His cardiac pacemaker prevented a tachycardic response to hypotension and maintained a pulse rate between 120 and 84.

Within two hours of admission his initial blood pressure had fallen from 160/90 to 98/50 despite two litres of fluid. While in CT, he was given a further one litre of fluid in response to a measured hypotension. Shortly after returning from CT he was given 50mg of IV pethidine which induced a respiratory arrest. At the same time a urinary catheter was passed from which 100ml of slightly bloodstained urine was obtained. He was sent to the ward with instructions to infuse one litre of Hartmann's over four hours. He received 3,000ml of clear fluid from admission until one hour and 45 minutes later. He received a further 2,200ml in the next five hours followed by three units of packed cells supplemented with Lasix over the next three hours.

Over the next nine hours he had persistent hypotension with blood pressure below 90/50 throughout this period, with the exception of a single reading of 110/60 following one litre of Hartmann's infused stat.

Following the initial l00ml of faintly blood-stained urine a further 90ml was present two hours later. During the following five hours there was gross oliguria recorded accurately on the chart with an average output of 12ml hourly. This coincided with persistent hypotension.

He was managed in the intensive nursing unit following transfer from the Emergency Department. An arterial line was inserted. The reduced urinary output was treated by Lasix. His haemoglobin fell to 40 and he was therefore prescribed four units of packed cells to be infused over nine hours.

He was transferred by fixed wing aircraft and admitted to the ICU of a major teaching hospital about 15 hours after admission, by which time his legs were mottled and he had been intubated. He was treated in ICU with inotropes, but developed irreversible rhabdomyolysis and died of progressive multi-organ failure 12 days after the accident.

Comment

In his late 80s with a pacemaker, this man had a limited capacity for his heart to increase the rate to respond to blood loss. His initial blood urea was normal which confirms he had useful renal function.

He received prompt clinical assessment including an initial infusion of two litres of fluid. Initial radiology showed multiple fractures on his left side, ribs, iliac crest, pubic rami and lumbar spine. At his age, the anticipated blood loss from multiple rib fractures and a pelvic fracture of this nature would be at least 2 to 3 litres. The initial infusion

was appropriate given his limited cardiac reserve.

Initial skeletal survey identified the fractures. He remained in X-ray for a total of one hour undergoing an extensive CT survey. During this time his blood pressure fell and he received 500ml of haemaccel. He had an acute hypotensive episode two hours after admission, following completion of the X-rays. His recorded sweating, his hypotensive episode, and the persistent fall in blood pressure provided clear evidence that he was under-perfused, even before catheterisation.

Urinary catheterisation was withheld until completion of his X-rays. After a further 500ml of haemacel he was charted for a further litre of Hartmann's over four hours. After the episode he became progressively hypotensive with a blood pressure below 100 systolic from six hours after admission. In addition, there was measured gross oliguria with an average output of 12ml per hour from five hours after admission. It is not clear from the records whether a senior nurse or doctor was aware of this. There is no record of further infusion occurring during his fixed wing evacuation. However, by the time he reached the city his legs were noted to be ischaemic and mottled, and his pulmonary function had deteriorated to such an extent that he was intubated before transfer. Although he survived a further 12 days in ICU, initially with renal failure and finally with multi-organ failure, it is likely that the outlook was hopeless.

The major adverse event was a failure to recognise inadequate fluid replacement despite several markers. These include an estimate of blood loss, progressive hypotension, progressive measured oliguria and an acute hypotensive episode following IV pethidine. While this adverse event contributed to death, it is probable that, in view of his considerable age and limited cardiac response, death was inevitable.

Allowing a reasonable time for assessment of stabilisation and mobilisation for aerial evacuation for a condition that could be described as urgent but not emergency, a reasonable expectation from injury to evacuation would be approximately six hours or longer. A delay in evacuation did not contribute to the fatal outcome.

Placement of a central venous line would have been more appropriate than an arterial line in the earlier stages, as a direct measure of perfusion.

Could Pre-operative Workup and Monitoring Have Been More Complete?

Summary

This 78 year old man was admitted to hospital for routine total knee replacement. Pre-operative assessment by the surgeon revealed that he suffered from severe heart failure, kidney failure, ischaemic heart disease and early dementia. He had a past history of pneumonia and pulmonary oedema. The surgeon was aware that the patient's medical condition would place him in the very high risk group for complications and the surgeon appropriately discussed the risks with the patient and his family. The patient and family accepted the risks and it was decided to proceed with the surgery.

The patient was admitted to hospital the day before his surgery. The anaesthetist saw him on the day of his surgery. The patient was anaesthetised using epidural anaesthesia, but he became increasingly more confused and was pulling his oxygen mask off. General anaesthesia was then administered to control the patient. The patient had one peripheral line in situ and he did not have central venous pressure or arterial pressure monitoring.

A routine and uncomplicated total knee replacement was performed. The surgical time was approximately one hour. The patient's recovery was uneventful and he remained in the recovery room approximately 25 minutes. He lost 550ml of blood whilst in the recovery room.

On return to the ward, the drains were de-suctioned and left to drain freely. The patient remained stable but confused until the following afternoon when his urine output began to drop. A blood transfusion and IV Lasix were given and the anaesthetist saw him in the evening. By that time the patient had a positive fluid balance of two litres and was short of breath. Further IV Lasix was ordered. The anaesthetist requested a review by the patient's cardiologist who was not available on that day. The physician on call reviewed the patient 24 hours later. By that time the patient was hypotensive, anuric, breathless, vomiting and had a distended abdomen despite fluid and blood infusion and diuretic treatment.

The patient was transferred immediately to the ICU , but despite aggressive cardiovascular and renal support treatment he continued to deteriorate with possible additional myocardial ischaemia or infarction, bowel ischaemia and *Klebsiella pneumonia* infection. He died four days later.

Comment

The events that followed this patient's surgery were reviewed very critically. I did not find that there was any major adverse event in his management whilst in hospital. There is, however, a couple of points I would like to make acknowledging that it is very difficult to say that the outcome would have been any different. Firstly, I would have expected that a patient with known severe cardiac disease, cardiac failure and renal failure pre-operatively would have been monitored more closely intra-operatively with central venous and arterial monitoring. Secondly, and for the same reasons, I would have expected that the patient would have been managed in the ICU immediately after surgery until his cardiac and renal functions were stable.

In addition, it is not clear from this patient's medical record whether the anaesthetist or his cardiologist saw him prior to his admission. If these reviews were arranged pre-operatively, then perhaps the medical condition of the patient could have been optimised prior to his surgery. This may have resulted in a better outcome, or at least convincing the patient and his family that it would be in the best interest of the patient not to have the elective procedure.

This is the case of a severely compromised patient both medically and intellectually who underwent an elective procedure. Pre-operatively, the ward nurses described him as "requires re-orientating often, wanders at times". It is clear that this patient was not capable of giving informed consent. The dilemma the surgeon faced in this situation was in deciding whether on not to agree to operate on a high-risk patient on the family's consent. In the case of an emergency, where the patient's life or limb is at risk, the decision is easy. However, when an elective procedure is contemplated, then surgeons and anaesthetists should use their judgment and consider declining to operate when the risks of the procedure clearly outweigh the benefits.

FAILURE OF PROPHYLAXIS

Failure to Use Prophylactic Antibiotics

Summary

A patient in his mid 70s was admitted with a 6 cm enlarging false aneurysm at the lower anastomosis of a Dacron ilio-femoral bypass graft carried out nine years previously. He had treated hypertension, CAL, gout, osteoarthritis, previous CVAs with no residual CNS deficiency and peptic ulcer disease (vagotomy).

The aneurysm had been noticeable for six to eight weeks, and had increased in size and become painful over the preceding two weeks. An arterial duplex scan carried out confirmed a false aneurysm at the lower anastomosis of the previous ilio-femoral bypass graft, and a long occlusion of the ipsilateral superficial femoral artery and proximal popliteal artery in continuity down to 8 cm above the knee where the popliteal artery was reconstituted by collaterals. On admission the swelling was not tender, warm or erythematous suggesting there was no clinical infection. The patient was afebrile, not distressed and normotensive. His renal function was only mildly impaired (urea 11.1 and creatinine 133).

The false aneurysm was opened the following day, and the Dacron graft was found to have separated from the arterial wall, and this was repaired with 4/0 Prolene. It did not appear infected, and a swab for microbiology was taken at time of surgery and reported (four days later) as isolating no pathogens (ie. there was no infection present). The operation repairing the false aneurysm was followed by failed extubation and the patient had to be re-intubated suffering probable CVA, peri-operative MI and acute left ventricular failure. The operation site was drained (two drains), with the drains being removed two days later. I can find no record of any antibiotic being given until 16 days after surgery (*Editor's note, WAASM Office: the patient received two doses of oral flucloxacillin commencing 13 days after the initial surgery, followed by IV Timentin for 3 days after which cephalothin was started*). However, the patient's condition improved with medical treatment.

A wound swab taken nine days after surgery was reported two days later (11 days after surgery) as being infected with *Staphylococcus aureus* (and perhaps *Proteus*). This was confirmed with a further swab collected 14 days after surgery (and reported 3 days later - ie. 17 days after the surgery). The antibiotic to which the *Staph aureus* was sensitive (cephalothin) was started on the 16th day following surgery. Additional progress was as follows:

- 15 days post-surgery he was well and medically stable.
- 16 days post-surgery he had chest pain, felt unwell and vomited, and had an increased WCC of 35. Subsequently, anorexia, diarrhoea and chest infection were diagnosed.
- 19 days post-surgery, infection of the graft was diagnosed and surgery scheduled by a consultant for the following day (approximately 30 hours later).
- 21 days post-surgery, further surgery was carried out - surgical excision of the distal portion of the graft, and sartorious muscle was relocated over the closed stump of the graft. The wound was partly closed - saline pack. Subsequently, the leg became very ischaemic and the patient's condition deteriorated.
- 24 days after the original operation, a right above knee amputation was carried out. Subsequently, the wounds in the groin and the amputation stump appeared necrotic with foul brown discharge. His general condition deteriorated with cardiac, respiratory and progressive renal failure, and he died four days later.

Comment

In vascular surgery, there is general acceptance that whenever a synthetic graft is involved directly in surgery that immediate cover with antibiotics is used at time of surgery, when the synthetic graft is being handled and during the post-operative period. I can find no record in this patient's notes that any antibiotics were given until 16 days following the initial surgical procedure.

Placing a drain (in this case two drains) down to the site of the graft further risks introducing infection to a synthetic graft, especially in the absence of any antibiotic cover. In this case there was no infection shown until a swab was taken nine days after the procedure - this being the first swab taken since the sterile one done at the time of surgery - and reported two days later. Even so, I can find no record of any antibiotics been given until five days after the report was available.

It is probable that the infected graft and subsequent operations, amputation and subsequent death may have been avoided by the use of antibiotics at time of surgery, and certainly at the very latest when results from a positively infected swab were available, instead of five days later.

Footnote

It appears that the same single antibiotic cephalothin was started on the l6th day following the first operation and continued until the patient died. Single doses of flucloxacillin and gentamicin appear to have been given. Only three swabs appear to have been sent to Microbiology at the time of original operation, as well as nine and 14 days later. Repeated swabs should have been taken since a change in the bacterial pathogens, as well as resistance to

the antibiotic being given, are common.

Usually broad spectrum antibiotic cover is utilised often giving several antibiotics to cover gram positive, gram negative and anaerobic pathogens, both as prophylaxis at the first operation when a synthetic graft is involved, and continued also with persisting infection. This is important because, as can be seen from this case, reporting from Microbiology can take from 2 to 4 days for type of pathogenic bacteria and antibiotic sensitivity to be available after the swab was first taken. This means that the actual pathogen isolated may have changed since the swab was taken and this is covered by continuing broad spectrum antibiotics in such cases especially when the infection is serious or life threatening.

Delay to Surgery and Lack of DVT Prophylaxis May have Led to Pulmonary Embolus

Summary

A 61 year-old morbidly obese female sustained a severe fracture associated with major morbidity and mortality for a patient in her category. The position of the fracture was that the femoral shafts were actually separated by the width of the femur. The patient did not receive DVT prophylaxis prior to surgery.

Comment

It is my belief that pre-operative anti-coagulant therapy could have caused significant bleeding from this fracture. There was a 48 hour delay in stabilisation of the fracture, and it is well recognised that long bone fractures are best stabilised as a matter of urgency to reduce the risk of fatal embolism, adult respiratory distress syndrome, etc.

There was no autopsy in this case, but a diagnosis of pulmonary embolism was recorded as the cause of death. I think this can only be presumed and, therefore, it is inappropriate to make a conclusion as to whether or not pre-operative prophylaxis for deep vein thrombosis should have been provided.

I believe, therefore, that there are concerns as to the delay in getting the patient to surgery. I have no concerns as to the operation that was performed, in approximately 1¾ hours, which I would regard as an appropriate time for this procedure.

I think other relevant factors in this lady's demise, in addition to her morbid obesity, were her insulin dependent diabetes, sleep apnoea, asthma and her greatly impaired mobility.

PERI-OPERATIVE CARE

Diminished Reserve Capacity of Organs in Elderly Patients Demand Special Care

Summary

A small 84 year-old lady (52 kg) with no history of cardiopulmonary disease, who was described as "usually fit and well", was admitted with a three day history of small bowel obstruction. Her past medical history included a right hemicolectomy for bleeding from the gut, hysterectomy and diverticular disease. She was not on any medication.

After failing to respond to conservative treatment, she underwent laparotomy two days after admission and five days after the start of her symptoms. A single band was obstructing the distal small bowel. The site of band occlusion on the gut had a bluish discolouration, which recovered except for two very small weak areas. These were oversewn.

From the first post-op day she had a fever of around 38°c. She also developed diminishing lung function ascribed to a combination of pulmonary oedema, bilateral consolidation/collapse and bilateral pleural effusions from fluid overload and excessive narcotic administration. By day 3 post-op the deterioration in lung function necessitated transfer to the ICU. This problem overshadowed the continuing abdominal distension and lack of gut function, the fever being attributed to lung infection (sputum cultured *Klebsiella pneumoniae*). On day six post-op a CT scan showed a small localised collection in the left iliac fossa. This was evacuated on the 8th post-op day. The abscess was related to the band occlusion site on the small bowel where there was a leak from a pinpoint perforation. A segment of bowel was resected. The rest of the peritoneal cavity was clear.

In the seven days that followed the second operation there was increasing sepsis (lungs, abdominal wound and bladder) and decreasing lung, heart and renal function. Five days after the second operation (13 days after the first) she underwent the third laparotomy in case there was continuing intraperitoneal sepsis. This showed abdominal wound infection. The entire peritoneal cavity was clean. She died two days later from multi-organ failure.

Comment

There are three areas that need critical attention in this case: (i) fluid overload, (ii) over-sedation, and (iii) surgical management of the gut occlusion site.

1. Fluid Overload

   In the first five days after admission this small lady received 27 litres of IV fluids, all of it crystalloid except for 3L of Haemaccel. This would appear to be excessive even after allowing for fluid loss in and around the gut, before and after the first operation. During the first three days after this operation she was being nursed in the ward and was seen by a number of different doctors during the day and night, thus straining the continuity of appropriate medical cover that is so essential in a sick patient. Furthermore, she may have benefited from an earlier transfer to the ICU. Here is the age-old problem of a patient too sick to be nursed in a general ward, but not sick enough, until later, to qualify for transfer to the ICU!

   One could resurrect the controversy of crystalloid versus colloid in resuscitation but, in the case of this lady, one should wonder if early use of albumin would

have produced a different outcome (albumin was used later). The serum albumin on admission was 41g/L. After the 5 days mentioned, it was 21g/L. The management of intravenous fluid therapy in a sick surgical patient, especially an elderly patient, should be the responsibility of senior surgical staff.

2. Over-sedation

   In the first two days after the first operation she was found at various times to be "drowsy, not opening eyes to voice, unable to vocalise and has pinpoint pupils". The respiratory rate was 12 at one time with shallow breathing, and pCO_2 was 63 mmHg (normal range 35-45). She was on a narcotic infusion and required several doses of naloxone to reverse the effects of sedation.

3. Surgical management of the gut occlusion site

   The obstructing band would, if given time, cut through the small bowel aided and abetted by the distension of the proximal loop and usually accompanied by ischaemia of the bowel localised to the band. This damage was recognised and the standard steps taken and the area oversewn. However, there was a leak, albeit small, and the surgeon, no doubt, has cast his mind back to consider why the over-suture was inadequate and if at that time there was sufficient evidence to opt for resection. Lastly, would a drain to the site of over-suture have made a difference?

Abdominal Problem Missed in Immuno-compromised Case

Summary

An 81 year old female presented with an inflamed wound with discharging sinus 6 weeks after a common orthopaedic procedure. She had a past history of Crohn's disease and was on moderate doses of steroids. The ambulance staff reported that she had fallen and spent many hours on the floor. The emergency department assessment noted multiple pre-tibial lacerations suggestive of previous falls. The reasons for her fracture are unknown, although it is assumed that she fell. Social issues are raised.

After assessment in casualty, where it was noted she had been vomiting and had loose stools. Appropriate management followed and she was taken to the operating room the following day. Her wound was debrided and it was noted that the wound infection appeared superficial. The treating surgeon explored the deeper tissues and an adequate wound debridement and lavage was performed. *Staph aureus* was grown and after commencement of empirical treatment with flucloxacillin and gentamicin, the flucloxacillin was continued. One can only assume that a central line was not inserted in the operating room because it was felt to be a superficial infection.

Two days post-operatively, a brief comment in the notes only confirmed unit assessment, with positive *Staph aureus* culture although the patient was seen in the shower.

Microbiology was consulted about sensitivities. The IV line had to be re-sited as a PICC line the following day and, from then on, the clinical record becomes busy. The nursing notes attest to daily loose bowel actions (? diarrhoea), episodic vomiting and nausea.

The blood investigations make interesting reading. On admission, C-reactive protein was noted to be markedly raised. In addition, the creatinine was normal on admission, but doubled by the fourth post-operative day. Despite adequate surgical debridement of the wound, the white cell count increased incrementally from the day of admission, with toxic changes on the blood film. The platelet count increased similarly. There must have been some concern because on the fifth post-operative day, an abdominal X-ray was taken when by this stage, the patient had clinical abdominal distension and the reporting radiologist concluded that a small bowel obstruction was present.

Given that the blood cultures on admission were negative, the only conclusion that one can make is that the *Staphylococcal* infection was superficial and that this patient succumbed from another cause.

With a past history of Crohn's colitis, with numerous previous admissions presenting with nausea, vomiting and loose stool, a concomitant diagnosis of inflammatory bowel disease was not considered and, on face value, there was either a small bowel obstruction or possibly even ischaemic bowel present. In an immune-compromised patient on more than maintenance doses of steroids, this clinical situation could be partially masked and obviously would lead to overwhelming sepsis.

On the fifth post-operative day, the physicians were consulted and a diagnosis of sepsis or possibly pulmonary embolism was made despite prophylactic anticoagulants. In view of the clinical findings of hypoxia and poor peripheral perfusion (? toxic shock), a decision was made not to admit to ICU and not to resuscitate. The documentation in respect of these issues is well done and there can be no confusion about the family's wishes in respect of palliation. Not surprisingly, the patient succumbed on the same day.

Comment

Wound infections do occur, particularly in immune-compromised patients. This patient underwent appropriate management of a post-operative complication although in a different institution to the place of original surgery.

Despite previous presentations with similar symptoms of vomiting and diarrhoea in a setting of active inflammatory bowel disease, it would appear that this diagnosis was not considered until quite late (day five post-operatively) and this patient's death is probably attributable to overwhelming sepsis from intra-abdominal misadventure. A post-mortem was not performed and would have been extremely useful.

Issues are raised in respect of adequate ward assessment, review of investigations performed where there is clear evidence of raised inflammatory markers and deteriorating bodily function. This case is perhaps a reminder of the fact that the whole patient needs to be cared for, not just

what appears to be the primary problem. Immune-compromised elderly patients do not survive otherwise.

Family Wished to Prolong Treatment

Summary

An 84 year old man presented to the Emergency Department of a non-teaching hospital in the afternoon with a sudden onset of back pain and a systolic blood pressure of 72 mmHg. He was known to have an abdominal aortic aneurysm and two previous endoluminal grafts had been deployed. These procedures were complicated by an endo-leak which could not be repaired percutaneously, and a decision had been made previously not to offer this elderly frail man an elective open repair. After discussion with the vascular registrar of a teaching hospital, the patient was transferred and arrived in the Emergency Department of the second hospital in the evening. The systolic blood pressure was 80 mmHg on arrival.

He was reviewed by the vascular registrar who discussed the situation with his consultant. The registrar recorded, "he is not for an emergency operative repair" and, "he is not for resuscitation". The next note in the medical records is eight hours later and records his arrival in the ICU following an emergency aorto-bifemoral graft that commenced 50 minutes after arrival at the second hospital.

A review some 12 hours after his surgery revealed that he had already developed significant renal impairment and coagulopathy. Two days later his left foot became ischaemic. Surgical intervention was not thought to be appropriate and the notes at this time document that the most likely outcome would be an amputation. Later the same day the patient commenced dialysis. The following day his poor prognosis was discussed with the family and it was made clear to them that no further vascular intervention was available and that if he failed to improve support would be withdrawn. During the next few days it proved impossible to wean him off the ventilator because of suppressed consciousness. Scans failed to show any new significant intra-cerebral lesions.

Nine days after the operation the renal physicians documented that the likelihood of the kidney recovering was low and the possibility of long-term maintenance dialysis needed to be considered. This was discussed with the family who wished to reach a consensus as to whether this would be appropriate. The notes record that the following day the family indicated they wished to continue active treatment. Eleven days post surgery the patient remained on a ventilator and had minimal renal function requiring dialysis. He continued to require inotropic support but this had been reduced.

He was eventually transferred to the ward 14 days after his surgery. During the next 12 days on the ward he faced a number of problems including the development of diarrhoea, further ischaemia of his foot and the development of abnormal liver function tests. He also developed pyrexia, but the source of the sepsis was not found. Ten days following his discharge he developed atrial fibrillation. This marked a significant deterioration and he eventually died 26 days after his surgery.

Comment

The consultant surgeon completing the proforma documented that the surgical team would have preferred not to have operated on this gentleman. This was also documented in the notes shortly after his admission. The family clearly put pressure on the surgeon to undertake a repair, but the reasons for the change of mind were not documented in the notes. The ICU notes clearly documents on numerous occasions that this gentleman's prognosis was "grim", but the clinicians continued with treatment because of pressure from the family. For what? If he had remained alive this 84 year old man would never have got home.

It is easy for this reviewer, with the advantage of hindsight, to be critical of those managing this patient. We have all been in the situation where the family wish to continue with treatment, which in the view of the clinicians has a high likelihood of failure. We have all treated patients against our better judgment because that is what the family wanted. That does not make it right.

There comes a point where clinicians have to act in the best interests of the patient. Occasionally, this may mean that it is necessary to go against the wishes of the family. I think this is such a case. The futility of treatment was recognised by the clinicians and discussed with the family on a number of occasions. Yet treatment continued. I think it would have been better not to have operated. I can (just) understand the surgeon giving him "one last chance" by operating. I cannot understand why the ICU persisted with treatment once it was clear that he was developing multiple problems from which he was most unlikely to survive.