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WAASM

A selection of

Case Note Reviews

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In collaboration with the Centre for Health Services Research (School of Population Health, University of WA) and the WA Department of Health

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Case Note Reviews

A first-line assessor reviews all surgical proformas returned to WAASM. When there is an educational point to be highlighted or if there appear to be factors that warrant further investigation, then a second-line assessment is made by reviewing the case notes. A consultant of a relevant specialty in a different hospital is selected to carry out the review. Second-line assessments are based on information provided by the surgeon who completed the surgical proforma, and on the case notes. They are sometimes limited by the quality of the note keeping. The assessor prepares a short report of their review. 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 reports, 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 will gratefully receive any comments regarding general points made in these assessments if you think they contain an interesting area of debate or controversy. Such correspondence should be sent to the WAASM office.

Edited by James Aitken and Frank Sanfilippo

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GYNAECOLOGY

Death from a PE: DVT prophylaxis missed?

A 60 year old female underwent surgery for removal of a large ovarian cyst that had the potential to be malignant. On induction of anaesthesia the patient collapsed and could not be resuscitated. A post-mortem revealed a massive pulmonary embolism. This must have arisen from a pre-existing DVT, so any prophylactic measures to prevent a DVT would have been too late. I do not think the surgeon could reasonably be expected to have anticipated such a precipitous event.

That said, this lady undoubtedly fell into a high-risk group for deep vein thrombosis. In the interests of inquiry, the following observations are offered:

1. This lady had been on HRT for approximately 10 years. Although HRT has minimal impact on the development of DVT, should the HRT in this patient have been stopped some weeks prior to surgery, given the high risk?
2. The CT scan performed the day before surgery showed bilateral ureteric obstruction and hydronephrosis. Knowing this, and that surgery was planned, did the radiologist view the scan for inferior vena cava or iliac veins compression? If so, a caval clip could have been put into position. This might have been life saving.
3. It is not clear that the patient had TED stockings. This should be routine for this type of surgery.
4. Pre-operative subcutaneous heparin should have been considered. Although there are divergent opinions concerning the timing of heparin prior to an epidural, a dose the night before (ie true prophylaxis) and a second dose after the epidural was placed would have been acceptable to most anaesthetists. If there was still a concern, this case might have merited another form of delivery of the analgesia, such as PCA, local anaesthetic infusion or pararectal nerve blocks at the time of surgery, and pre-operative subcutaneous heparin.

VASCULAR

Delay in managing an ischaemic leg

A diabetic patient presented with a critically ischaemic left leg with ulceration. Comorbidities included NIDDM and prostatic carcinoma with skeletal metastases progressing despite previous hormone treatment. The effectiveness of a recent change in hormonal medication had not been reassessed before his death.

An urgent arteriogram ordered on the day of first consultation was not carried out until 27 days later. At that stage it showed an operable femoro-popliteal occlusion. A femoro-popliteal bypass graft was booked for eight days later. Seven days after the angiogram, the patient became short of breath and the left leg became acutely ischaemic, cold and pale. Duplex ultrasound showed no flow in the superficial femoral or popliteal artery and no tibial artery patency. There was no evidence of DVT. The leg was judged not to be salvageable and left above-knee amputation was planned for that afternoon. The patient was moved into the high dependency unit because of hypotension with deteriorating renal function, hyperkalaemia and poor renal output. A left A-K amputation was carried out that night. Death due to septicaemic shock and multiple organ failure occurred 18 hours later.

Comment

There was about a one-month delay in achieving a diagnosis and planning subsequent treatment to salvage this patient's critically ischaemic left leg, after which surgery was then further delayed for eight days. Diabetic patients are especially prone to acute infection with subsequent rapid increase of degree of critical ischaemia.

Even if an urgent arteriogram could not be booked for a month after it was ordered, non-invasive vascular doppler and duplex studies could have been carried out immediately to assess the severity, site, extent and operability of the occlusion. This was only requested in the terminal stages (far too late) when all the arteries in the left leg had become occluded. An earlier doppler scan might have saved both the patient's limb and life.

Between the arteriogram and the operation, the patient was often hypotensive and had almost certainly become dehydrated due to fluid loss in vomiting and faecal incontinence. Both could have predisposed to occlusion of all the arteries in the left lower limb, no doubt contributed to by infection of the ischaemic ulcers further aggravated by the presence of NIDDM.

HEPATOPANCREATICOBILIARY

Elderly unfit patient with obstructive jaundice

This patient in his mid 80s was admitted as a surgical emergency with abdominal pain and vomiting. There was a significant past history of chronic atrial fibrillation, diastolic heart failure and pulmonary hypertension. An endoluminal repair of an abdominal aortic aneurysm had been carried out the previous year. An abdominal ultrasound scan ordered from the emergency department showed multiple calculi in the gallbladder and a calculus in the common bile duct. The wall of the gallbladder was thickened. There was also dilatation of the intra-hepatic ducts. Investigations showed a white cell count of 14, bilirubin of 39 and ALP of 161. The patient was treated with intravenous fluids, intravenous ceftriaxone 1g daily, and intramuscular morphine for the pain.

Approximately 22 hours after admission, the patient was taken to theatre for a planned laparoscopic cholecystectomy. Following induction of anaesthesia there was an episode of severe prolonged hypotension. External cardiac massage was performed for approximately 5 minutes. The patient had a good but transient response to adrenaline. The operation was abandoned and the patient transferred to the intensive care unit.

The patient was ventilated and treated with inotropes and pressors and volume challenge. In spite of this, the blood pressure continued to drop and the patient became anuric. Treatment was discontinued some 12 hours later, and the patient died within 20 minutes.

Comment

I do not feel there has been any major adverse event in the management of this case that contributed to the ultimate outcome. The patient was medically compromised with severe cardiac disease, hypovolaemia and sepsis.

The case notes do not state whether the patient had a fever or abdominal tenderness. The abdominal ultrasound scan and blood results indicate a likely diagnosis of acute on chronic cholecystitis with lithiasis, and choledocholithiasis. Cholangitis may have been a complicating factor.

I think it would have been preferable to treat the hypovolaemia and sepsis more aggressively before undertaking an operative procedure. I am not sure that laparoscopic cholecystectomy was the most appropriate procedure for this patient. ERCP and endoscopic sphincterotomy and removal of the calculus from the common bile duct may have been preferable as a first procedure, followed by cholecystectomy once the patient's condition had improved. However, ERCP and sphincterotomy is also associated with appreciable morbidity. Although it is not in the case notes, I note that the surgical proforma states that pre-operative ERCP was discussed with a gastroenterologist, and a decision was made for cholecystectomy first. The consultant also mentioned the possibility of percutaneous drainage of the gallbladder. I do not think that this would have been appropriate, as it would have been unlikely to decompress the biliary system, and would be associated with a significant risk of bile peritonitis.

COLOPROCTOLOGY

Technology triumph over common sense, or a triple tragedy

This case involves an 81 year old who was transferred from a peripheral hospital following admission for treatment for a community-acquired pneumonia. He presented with left chest pain and left loin and abdominal pain, and was on full doses of intravenous antibiotics and intravenous inotropic cardiac support. His pulse rate was 130, BP 78/52, oxygen saturation 80% and he was afebrile. Examination revealed decreased air entry to both lungs and a soft abdomen with some tenderness on the left. A diagnosis of septic shock was made. Chest X-rays confirmed the presence of left lower lobe pneumonia. Blood tests and CT scan of the abdomen were arranged.

At this point, any experienced clinician assessing this case would have doubts about this man's chances of survival. His past history included chronic obstructive airways disease, his cardiovascular status required inotropic support and he was in obvious respiratory failure. Despite his grave prognosis, a laparotomy was arranged to exclude an intra-abdominal source of infection. This was negative and the man was transferred to the intensive care unit in a teaching hospital.

On the day after admission, one of the entries in the ICU notes read as follows: 'Condition poor, on maximum cardiorespiratory support. Renal failure. Coagulopathy. Hypoglycaemia. CNS, left pupil fixed, no brain stem reflexes'.

At this point I think it is quite apparent that this man had absolutely no chance of surviving and it is my opinion that further active treatment should have been stopped. However, this was not the case and he continued on in ICU requiring virtually full support for his failing organ systems. There was an entry in the ICU notes a week after admission "if respiratory arrest for full resuscitation" !!!

On the 13th post-operative day a gastroscopy was carried out and bleeding mucosal plaque and erosions were treated. There was also a 3cm mucosal tear from which he was bleeding.

Over the ensuing days the patient continued in his vegetative state when a further week later a repeat laparotomy was performed. This time gangrenous bowel was found, no doubt as a result of a combination of poor perfusion, hypoxia and the vaso-constrictive affect of his inotropes. A right hemicolectomy was carried out on this occasion.

The patient was then returned to ICU where his dying was prolonged for a further six weeks. He succumbed two months after admission.

I think this was a triple tragedy. Firstly, it was a tragedy for the patient in that his dying was unnecessarily prolonged for two months. Secondly, it was a tragedy for the family who were subjected to indignity of seeing their loved one undergo this dehumanising process. Thirdly, it was a tragedy that the enormous cost in this exercise was not channelled to a more appropriate use within the health system.

Post-operative cardiac failure following anterior resection

This elderly patient with significant comorbidities underwent an anterior resection of a stenosing carcinoma of the rectosigmoid colon. There were significant comorbidities including arthritis, hypertension, hiatus hernia and early dementia. The patient was no longer fully independent because of this immobility. Due to a non-substantiated history of malignant hyperpyrexia, and the unavailability of an Intensive Care Unit bed, the patient was transferred for surgery. There was no noted problem with anaesthesia in the past.

Intra-operative pressors and inotropes were required to maintain an adequate blood pressure. The intra-operative course was otherwise uneventful. Because of the intra-operative haemodynamic instability the patient was ventilated overnight in the Intensive Care Unit. Inotropic support in the form of infusions of adrenaline and dopamine were required during the first night and an episode of atrial fibrillation was successfully treated with intravenous amiodarone. Nevertheless, he was discharged from the Intensive Care Unit on the day following surgery, 18 hours after admission and 2 hours after cessation of dopamine. Whilst in the Intensive Care Unit his urine output varied between 20 and 70 ml per hour.

A persistent ileus and poor urine output requiring additional fluid boluses complicated the post-operative period. This resulted in noted peripheral oedema. The patient was reviewed on day five by the Intensive Care Unit resident with a view to re-admission to the ICU because of continuing oliguria and hypotension. Further fluid was administered on the ward pending review by the Intensivist. This review was not documented in the notes.

On day six the patient became short of breath, restless and was noted to have removed his nasogastric tube. On day seven the patient was re-admitted to the Coronary Care Unit because of shortness of breath and rapid atrial fibrillation. At this time he had a persisting paralytic ileus, oliguria and appeared tired and unwell. He was also noted to have cool peripheries. Atrial fibrillation was treated with amiodarone and digoxin without effect and he was noted to deteriorate and remained unresponsive to treatment.

In view of his comorbidities, and in discussion with his family, it was agreed that invasive resuscitation was not required. He died on the day after admission to the Coronary Care Unit.

Comment

This elderly gentleman with significant comorbidities died eight days following an anterior resection with a covering ileostomy. His risk status was appreciated early, as he was transferred to a hospital with Intensive Care Unit facilities and the availability of an ICU bed. He was discharged relatively early from the ICU and although considered for re-admission (unsuccessfully), these were probably significant decisions. The onset of atrial fibrillation required transfer to the Coronary Care Unit but treatment was unsuccessful and he died. I am unsure if earlier admission to ICU would have altered the ultimate outcome in this patient. Nevertheless, for optimal care I feel it would have been appropriate. However, it is not possible to say if the outcome would have been any different.

Possible missed anastomotic leak

An 85 year old man with a history of early dementia and non-insulin dependent diabetes was admitted for a right hemicolectomy after being found to have an obstructing ascending colon cancer. His haemoglobin was 76 on admission and the patient was transfused with 2 units of packed cells.

A registrar, assisted by the consultant, carried out the operation. At laparotomy, the tumour in the ascending colon was described as bulky and invading into the perinephric fat and third part of the duodenum. Nevertheless, a right hemicolectomy was carried out with excision of a small cuff of duodenum

(seromuscular only). The defect was repaired and a side-to-side stapled ileo-colic anastomosis was performed.

Post-operatively, he was well and was tolerating nourishing fluids. Deterioration occurred on the 4th post-operative day when he developed a low-grade temperature and was noted to be confused and agitated. Mild renal failure was noted and three days later he developed abdominal pain/distension, which progressed to peritonism. He passed away day 12 post-operatively.

Comment

The patient was described as frail on admission by both the nursing and anaesthetic staff. With the finding of possible local invasion at laparotomy, a case could possibly be made for an ileo-colonic bypass rather than an en-bloc resection with a cuff of duodenum, even though resection offers the best palliation. At times, it can be difficult to assess the nature of local invasion especially into the duodenum. This scenario is not common and usually the plane of dissection is obscured by inflammatory reaction rather than tumour infiltration. On most occasions, a plane can be found between the colon and the duodenum. Pre-operative CT scan showed stranding of pericolic fat only. Surprisingly, the final histology provided no comment on whether there was invasion of tumour into the duodenum.

An anastomotic leak was the most likely cause of death in this patient. However, what is of concern is that no investigative action was taken when the patient suddenly became confused and febrile, other than being started on a major tranquilliser (haloperidol). The patient later developed signs of abdominal peritonism and died. If a leak was indeed the cause of this patient's death, detecting it earlier may have made a difference. Upon review of the notes, there was no evidence that this potential complication was considered at any stage.

PLASTICS

Serious cardiac problems compounded by peripheral vascular disease

This elderly patient was transferred from another hospital suffering from cardiac de-compensation possibly due to recent infarction. He also complained of pain and swelling of his right leg which was thought to be due to cellulitis. Initial investigations confirmed recent acute cardiac damage, but there was no obvious cause found for his leg symptoms. Initial investigations ruled out embolism and DVT, and appropriate treatment for cellulitis was commenced and he was transferred to ICU.

Over the next 24 hours it was noted that his leg symptoms and signs were worsening but there was still no evidence of compromised circulation either arterial or venous. Presumptive diagnosis of myositis +/- fasciitis was made. In the meantime his cardiac function was steadily deteriorating despite appropriate drug therapy.

His right leg continued to deteriorate and following review by a new surgical team it was decided that surgical exploration and debridement of his necrotic tissue in the right calf below the knee was required. This procedure was done on the fourth day after admission and finally a positive culture was made of the infecting organism. However, despite appropriate antibiotic treatment there was continued deterioration and a second surgical exploration and debridement was carried out on the fifth hospital day.

By this time it was evident that there was gradual multi-organ failure secondary to overwhelming sepsis and the cellulitis now extended to the groin. Subsequently all peripheral pulses in the right leg were impalpable and an attempt was made at embolectomy on the fifth day after admission. This did not improve the situation with regard to circulation in the limb and despite control of sepsis there was gradual failure of all major systems because of his underlying cardiac problems, which did not respond to treatment and he died on the twelfth day after admission.

Comment

I did not see that there was any specific surgical adverse factor that may have resulted in a different outcome in this elderly patient. His underlying cardiac problem was probably irreversible, and when this was complicated by progressive cellulitis and sepsis from his right leg and subsequent thromboembolism (that did not improve after embolectomy) then the likelihood of recovery was minimal. Perhaps an above-knee amputation may have been an alternative treatment with a better outlook, but I doubt whether the patient would have consented to that procedure.

SUPERVISION

Long operation by junior surgeon

A 71 year old man was investigated for a history of weight loss, lethargy and anaemia. A barium swallow demonstrated an antral ulcer and suggested an underlying malignant cause. At gastroscopy, a 5cm antral ulcer was found, which was deeply penetrating and had raised, rolled, everted edges. The ulcer was macroscopically malignant, but biopsies were benign. A coincidental hiatus hernia was noted. A second gastroscopy was performed two weeks later at which the findings were unchanged and biopsy again failed to demonstrate malignancy. A CT scan demonstrated a 4cm mass on the posterior antral wall. A chest X-ray showed cardiomegaly, but no pulmonary disease.

Prior medical history included diabetes treated by oral therapy, and hypertension treated with beta-blockers and ACE inhibitors. Serologic analysis demonstrated chronic renal disease and anaemia. A presumed diagnosis of gastric carcinoma was made. The patient was considered for the MAGIC trial, but excluded because of poor renal function and an abnormal ECG

suggesting anterior and inferior myocardial infarcts and atrial fibrillation.

The patient was admitted to hospital for a partial gastrectomy. Clinically, the intern noted crepitations in the left base and atrial fibrillation. The records did not indicate a pre-operative assessment by an anaesthetic nor a cardiac consultant.

A distal gastrectomy with a Billroth II anastomosis was performed. There was no note to suggest that there was difficulty experienced by the surgeon. The anaesthetic record indicates that the surgery took approximately four hours and the flow chart showed a stable cardio-vascular and pulmonary status throughout the operation.

After an uneventful initial post-operative recovery, the patient developed a sudden shortness of breath on the fifth post-operative day. Transfer to the coronary care unit was made the following day. The white cell count was elevated (16.3), creatinine had risen to 246 and serum cardiac profile suggested myocardial damage. An echocardiogram demonstrated "severe impairment of left ventricular systolic function (the left atrium is markedly enlarged), with moderate pulmonary hypertension". The coronary care consultant wrote that beta-blocker therapy had apparently ceased following surgery and felt that this had produced uncontrolled hypertension and heart failure.

A discussion occurred between medical staff and the patient's wife, following which a "not for resuscitation" order was placed in the notes. The patient died on that day.

Comment

The pre-operative assessment indicates that this patient was a high anaesthetic and surgical risk. There is no documentary evidence of pre-operative assessment by an anaesthetic consultant nor a cardiac physician which may have precluded him from surgery or indicated the need for peri- and post-operative specialist attention.

The procedure of partial gastrectomy with Billroth II anastomosis is not complex, and the operative duration of four hours suggests difficulty with the procedure or inexperience by the operating surgeon. Limiting the duration of the anaesthetic and surgical procedure would have been beneficial, and reduced the risks of cardiac and pulmonary complications.

Post-operative care was provided on the surgical ward. The use of intensive care or high-dependency care in the initial post-operative period and assessment by senior surgical staff would have been appropriate in this high-risk case.

The definitive histological diagnosis was benign gastric ulcer with no evidence of malignancy. Whilst this raises the question of whether the surgery was necessary, it is well known that difficulties may be encountered in diagnosing gastric malignancies because of the depth of disease and the presence of overlying fibrosis and slough. The physical appearance of the ulcer and the CT findings suggested a solid lesion, and a presumed diagnosis of carcinoma was reasonable. The choice of surgical procedure was appropriate and the rationale for conducting surgery was sound.

The duration of a surgical procedure is a major contributing factor to post-operative morbidity, especially in patients with pre-existing cardiac, pulmonary and renal disease. The decision therefore to perform the surgery without an anaesthetic consultant opinion and the performance of the surgery by a junior surgeon, who is likely to take longer than a senior consultant, may have been an error.

Identification of the high risk patient

An 85-year-old woman was admitted acutely with a left multi-fragmentary proximal femoral fracture. There was a past medical history of chronic renal failure, tachyrhythmia, and hypothyroidism. The patient was taken to the operating room on the day of admission for open reduction and internal fixation. An unassisted basic trainee completed the surgery. The operative note indicated first open reduction and wiring of the subtrochanteric component and during the insertion of the rod the fracture extended into the greater trochanter. A third generation intramedullary rod was used to stabilise the fracture configuration. The operative time may only be inferred from the anaesthetic record and appears to be between 2-3 hours.

The patient's initial post-operative care was uncomplicated, transferring from recovery to the hospital's high dependency unit and based on initial satisfactory observations, transferred to the orthopaedic general ward. During the immediate post-operative period, the patient was transfused due to low haemoglobin. The patient's post-operative observations began to deteriorate overnight between the first and second post-operative days, with falling urine output and increasing respiratory distress. Then followed approximately 40 hours of low urine output, and respiratory distress as a result of a combination of increasing pulmonary oedema and developing pneumonia. The patient remained on a general orthopaedic ward until the evening of the third post-operative day where she was transferred to Intensive Care with the initial diagnosis of respiratory failure, acute on chronic renal failure and congestive heart failure.

During the following seven days the patient received maximal medical treatment for the above-mentioned medical diagnoses and ultimately was unable to recover when cardio-pulmonary support was withdrawn on the tenth post-operative day.

Comment

The first area for consideration is the identification of the high-risk patient leading to the appropriate resources for the management of these patients. In retrospect it is suggested that the 40 hours the patient remained medically unstable on a general orthopaedic

ward prior to ICU admission contributed to the patient's final outcome. Based on the medical records it would appear that junior residents were largely involved in the direct management of the patient with telephone consultation with medical registrars until the morning of the third post-operative day when it appears a medical registrar saw the patient.

Despite this, it was not until the evening of the third post-operative day that the patient was admitted to Intensive Care. Ideally, the hospital's decision-making pathways should recognise a serious deterioration in a patient's condition and recognise the level of care required. In the situation of this particular patient there appeared to be low levels of experienced clinician supervision and or clear established pathways of management for the medically compromised surgical patient.

The second area for consideration is whether it is appropriate that a single basic surgical trainee undertake such a surgical procedure. The surgical records of the hospital give no clear indications to the actual surgical time although this may be inferred from the anaesthetic record. The first surgical aim in the treatment of these proximal femoral fractures is the stable fixation allowing early weight bearing for which experience has shown to increase the likelihood of recovery both of function and to reduce post-operative morbidity. The surgeon's post-operative recommendations were for non-weight bearing for an unspecified period.

The surgical management of this fracture would have been made more difficult by the lack of an assistant and would have been undoubtedly prolonged due to the limited experience of the surgeon. If the patient had been able to begin mobilising on the first post-operative day then there would be no question as to whether the surgical treatment did not contribute to the patient's ultimate outcome.

The hospital would best learn from the experience of this patient by developing methods of identification of the high risk surgical patient that allows more experienced clinician input into the care to reduce the likelihood of this situation developing in the future.

Fluid overload by inexperienced junior

This 74 year old man presented initially with a three week history of left iliac fossa pain. Investigations revealed him to have a malignant stenosis of the rectosigmoid. He was significantly overweight and had been taking warfarin for atrial fibrillation. His pre-operative general health was otherwise quite good.

Three days after admission an anterior resection was performed. He was found to have an abscess associated with the tumour. The tumour was resected with a primary stapled anastomosis. The post-operative period was complicated by a vesicocolic fistula. The origin of this fistula is not clear as the original operation note indicated there was no connection between the tumour and the bladder. A subsequent loop ileostomy was performed and he made a satisfactory recovery from this and was discharged home. He subsequently underwent a course of radio/chemo therapy for his Duke's C tumour.

Approximately 15 months later, he was readmitted to hospital to have his loop ileostomy closed. His warfarin was ceased pre-operatively and his INR returned to a normal level. The colostomy closure was performed by a registrar assisted by a consultant.

Post-operatively, a physio noticed bilateral basal crepitations within about 24 hours. For some reason, in the middle of the second post-operative day the patient was given three litres of saline over a period of about seven hours, with a fourth litre being given over the next six hours. The following day (ie within 48 hours of his surgery) he was found to have developed pulmonary oedema. The following day (ie day three post-operatively) the notes record that the pulmonary oedema had settled and that his stomach was distended. At this stage his urinary output had evidently dropped. I was unable to find fluid balance charts pertaining to this period post-operatively. Nonetheless, he was still being given three litres of fluid intravenously per day on the basis that he had passed 400ml of urine and had 760m1 of gastric aspirate. A medical registrar saw him at about this time and felt he should be transferred to a high dependency unit, but he arrested before that was achieved.

Comment

Although the technical closure of the ileostomy was uneventful, a post-mortem revealed him to have a significant haematoma. Clinically his bowel did not recover from this closure such that he had a grossly distended abdomen and moderately high gastric aspirates in the early post-operative period. During this time he required close monitoring of his intravenous fluids and urine output. The notes do not include enough details to comment properly, but the inference is that a junior resident was struggling to resolve this problem and may have administered an excessive amount of intravenous fluid over a short time in the middle of the night. Review of these notes suggests that this latter feature may well have been improved upon, but the general management of the patient seems to have been reasonable and generally appropriate under the circumstances.

Excessive intravenous fluids combined with post-operative myocardial infarction in an elderly man undergoing elective hernia repair

This elderly man underwent elective mesh repair of an incisional ventral hernia under general anaesthesia. His co-morbidities included age greater than 80 years, non-insulin dependent diabetes and gastro-oesophageal reflux disease.

Four litres of intravenous crystalloids were administered within the first 24 hours. On the morning of the second post-operative day, the patient was noted to be mildly hypotensive and oliguric, and on review

by junior staff was thought to be dehydrated. A fluid challenge of 1 litre over four hours was administered and the patient subsequently became increasingly hypotensive, dyspnoeic and drowsy. A clinical assessment by a consultant physician later that day made a diagnosis of acute pulmonary oedema and a probable peri-operative myocardial infarction (ECG change, raised troponin). The intravenous fluids were ceased and intravenous frusemide commenced. The patient had not improved by the second post-operative day and developed acute renal failure, necessitating transfer to a teaching hospital. The patient's hypotension improved without the need for inotropes but his oliguria and renal failure did not respond to high doses of intravenous frusemide. Consideration was given to dialysis after 4 days but on the 5th day, the patient experienced an asystolic cardiac arrest and could not be resuscitated.

Comment

The primary cause of this man's death was a peri-operative acute myocardial infarction leading to cardiogenic shock and acute progressive renal failure. His pulmonary oedema was exacerbated by excessive use of intravenous fluids during the first 24 hours and misdiagnosing the oliguria as dehydration, resulting in further fluid challenges. Whilst this may not have changed the eventual outcome, it would have hastened the development of acute heart failure on the second day. The second issue relates to the degree of urgency for repair of this man's ventral hernia. As the surgery was carried out at a non-teaching hospital, there is a lack of documentation pertaining to the need for surgery in this man.

My overall assessment is that whilst there were some adverse events with fluid management, these were not a direct cause for his death.

UROLOGY

Salvage cystectomy after radiotherapy

A 70 year old man suffering with depression and moderate emphysema, had been treated with chemotherapy and radiotherapy in the preceding months, for a poorly differentiated transitional cell carcinoma of the bladder. No records are available as to the timing and dosage of radiotherapy or chemotherapy. However, a decision was undertaken by the urologist that the patient undergo a salvage cystectomy with ileal diversion. The tumour was on the left side of the bladder and moderate left hydronephrosis present due to left ureteric obstruction. His pre-operative creatinine was 115, haemoglobin 129 and no secondaries had been detected. It was a probable T2/T3 lesion.

At surgery the tumour was stuck to the left pelvic wall and extensive bleeding was encountered, with a blood loss of 2.5 litres. Ureteric stents were placed with Blake drains down to the pelvis and adjacent to the uretero-ileal anastomosis. No reference was made as to the radiation changes present in the small bowel, and post-operatively the patient was transferred to ICU. The histology of the bladder showed a poorly differentiated TCC with left ureteric involvement and vascular and lymphatic invasion present with extension of the tumour into the peri-vesical fat.

Post-operatively the patient was given 2 units of packed cells. During the first 48 hours he had a poor urine output with his creatinine subsequently rising to 358 by the third post-operative day. He also became coagulopathic with INR rising to 3.2. However, this resolved spontaneously and by the fourth post-operative day his renal function was improving. A urine leak developed with about 500 ml of urine a day coming out through his peritoneal drains. Paralytic ileus was prolonged, and by the 11th post-operative day, he was still nauseated, but showed gradual improvement. By the 18th post-operative day it was felt that due to the ongoing uretero-ileal leak, he should undergo laparoscopy, with possible laparotomy. There was no suggestion of a faecal leak. The laparoscopy was converted by the treating urologist to an open laparotomy and multiple holes in the small bowel were oversewn. The uretero-ileal anastomosis was also repaired, there being a fairly large defect at the anastomotic site between the ureters and ileal loop.

The stents were left *in-situ* and a pelvic abscess was also drained at this time. No reference was made as to whether or not bowel damage occurred during laparoscopic insertion of the ports. However, this appears likely. There was a hole in the stapled small bowel anastomosis that was oversewn, while no reference was made in the notes as to the number of bowel perforations nor to the specific site.

Post-operatively, the patient was transferred back to ICU and his general state continued to deteriorate over the next 3 weeks with the development of sepsis, bilateral pleural effusions and anaemia. The urine leakage continued from the peritoneal drain and naso-gastric feeding was commenced 7 days after the second operation. He started to drain bile-stained fluid from his ileal diversion and, due to the ongoing urine leak in spite of the presence of ureteric stents, bilateral nephrostomy tubes were inserted.

Eleven days later the patient developed a fever with evidence of peritonitis and both nephrostomies ceasing to drain. Subsequently faeculent material drained from both his nephrostomies, ileal diversion and from his peritoneal drain. A CT Scan done on the 15th post-operative day confirmed a cutaneous fistula with contrast down an old drain site communicating into the transverse and descending colon. A general surgical opinion was sought as to whether or not a de-functioning ileostomy would be appropriate. However, the patient declined and he continued on a downhill course and succumbed 21 days after the second procedure.

Comment

A two-stage salvage cystectomy procedure has a lower operative mortality and morbidity rate than single stage (Grimes et al. 1972, Journal of Urology, 108: 872-874). This involves ileal diversion being undertaken and approximately 4 weeks later the cystectomy being performed. This should be considered in high-risk patients.

In the presence of a significant breakdown in the uretero-ileal anastomosis, the wisdom of considering laparoscopic repair must be questioned. It would have been more appropriate for the patient to undergo an open procedure, rather than commencing with laparoscopic surgery 17 days following his initial cystectomy and ileal diversions. It is questionable whether a urologist should be undertaking laparoscopic examination in this setting unless highly skilled in laparoscopic surgery.

Prophylaxis for deep vein thrombosis was absent during the initial surgery, which is considered standard practice in this type of surgery. However, prophylactic therapy was given following the second procedure.

In summary, the outcome for this patient may well have been different if the patient had a staged procedure. However, this is not a strong criticism. The decision to undertake a laparoscopic inspection of a known uretero-ileal leak warrants review. If no bowel leaks had occurred, then the outcome following the second procedure might have been different.

ANTI-COAGULATION

Post-operative bleeding from low molecular weight heparin

An elderly 89 year old woman was referred for a total hip replacement. Past history included at least two documented myocardial infarctions, with associated ischaemic heart disease, angioplasty, hypertension, hypothyroidism treated with thyroxin, and non-insulin diabetes well controlled with oral hypoglycaemics. The patient had been hospitalised prior to the index procedure in the preceding six weeks with difficulty with mobility and pain. A pre-operative anaesthetic consultation was sought two weeks before surgery.

An uncomplicated total hip replacement followed. There were no apparent peri-operative problems. However, 12 hours post-operatively she developed ischaemic chest pain and was transferred to the coronary care unit. The notes suggest that there was a significant positive fluid balance but her condition actually stabilised over the next three days before suddenly deteriorating. This was despite the usual protocol of mobilisation being followed after total hip replacement. In the last 24 hours before death, it was noted that there was excessive swelling of the right lower limb and particularly the right thigh. Difficulty was encountered maintaining haemoglobin levels and the inference was that there had been post-operative bleeding into the right thigh and leg.

On reviewing the case notes, it was noted that her prophylactic dose of low molecular weight heparin (Clexane) was significantly increased on admission to the coronary care unit. The dose given was equivalent to the formal treatment of a significant pulmonary embolus. On the basis of the file material, there was no evidence of thrombo-embolism. It would seem that significant secondary bleeding occurred into the right leg, and in the presence of ischaemic heart disease and compromised cardiovascular function, the development of oliguria with deranged renal function and hyperkalemia led to the development of systems failure even though the Clexane dose was reduced in the 24 hour period before her death. This was despite transfer to the Intensive Care Unit where initial resuscitation was pursued, but subsequently withdrawn after discussion with the family and adequate documentation of this.

Comments

It is not clear in the notes why the dosage of Clexane was changed from 40mg once daily to 80mg bd (*see editor's comments*). This, in combination with further ischaemic changes consistent with myocardial infarction, probably contributed to a degree of hypoxia further compromising the cardiovascular system leading to the development of renal failure.

I think the post-operative bleeding into the right thigh and leg was significant, but the appropriate management would have been to cut back on the use of the large dose of low molecular weight heparin being given in the coronary care unit rather than contemplation of further surgery, which I suspect would have had catastrophic results.

This case demonstrates the risk in using high therapeutic doses of low molecular weight heparins in elderly patients in the peri-operative setting. There is evidence of similar problems in the medical literature around the world, and I am aware of at least one study that was aborted in the United Kingdom because of excessive bleeding with the use of a similar agent.

Comment from the WAASM Office

The patient was noted to have rhythm-related angina which reverted to sinus rhythm on admission to the coronary care unit. There were also ECG changes suggestive of non Q-wave myocardial infarction. The dose of Clexane for this indication is 1mg/kg bd for 2-8 days. For the patient's weight of 83kg, a dose of Clexane of 80mg bd was within the prescribing guidelines for the given indication. A total of five doses of Clexane at 80mg bd was administered. Furthermore, the patient received a 300mg loading dose of clopidogrel post-operatively, followed by doses of 75mg mane. The loading dose was given on the same day that Clexane was started at 80mg bd. Whether these two drugs acted synergistically to increase the risk of bleeding in this patient is unknown.