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Western Australian Audit of Surgical Mortality

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WAASM

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Case Note Reviews

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CASE NOTE REVIEWS

The WAASM and TASM audit deaths that occur whilst under the care of a surgeon using the same methods and protocols. All completed surgical proformas returned to WAASM or TASM, 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, a second-line assessment is undertaken. A consultant from a relevant specialty in a different hospital prepares this review. Second-line assessments are based on information provided by the surgeon who completed the surgical proforma, and from the case notes. These reports undergo minor editing if necessary, and are anonymised.

A selection of the case note reviews from WAASM and TASM, some of which have been edited further to decrease their size, are combined here into a booklet and sent to all surgeons for educational feedback.

Correspondence regarding individual cases presented here is not possible, however WAASM and TASM welcome any comments.

DIAGNOSIS/DELAYS

Mesenteric vascular occlusion missed

Summary:

A 67 year old lady in generally moderate health was admitted with respiratory problems presumed secondary to smoking. At that stage she was found to be in atrial fibrillation and placed on warfarin.

She presented to the Emergency Department of Hospital 1 in the middle of the afternoon with a four day history of generalised abdominal pain worsening that day. This had been associated with vomiting x 2 and some constipation. The patient was admitted to Hospital 1 later that afternoon with a working diagnosis of diverticulitis which seems not unreasonable given her clinical findings on examination. There were three findings which perhaps might have raised concern. The first of these was that she was hypotensive, the second was a white cell count of 30,000 (all neutrophils), would be a little bit surprising, and the third was that she was moderately acidotic.

At best I can tell she was appropriately assessed in the Emergency Department and my understanding is that she was admitted to the short stay ward there. This appeared to be managed appropriately.
At 2000 a CT of the abdomen was performed which showed evidence of occlusion of the superior mesenteric artery 1.5 cms from its origin. It did not comment on whether this was thought to be an embolus or thrombus. After this report "the case was discussed with the Doctor at Hospital 2, happy to take over tomorrow".

The patient required considerable input during that night and was reviewed several times by the appropriate specialists for issues of pain relief, fluid management, vasopressors and the like. In the small hours of the morning the patient was transferred to Hospital 2 to the intensive care ward there. At that time the diagnosis was that of acute vascular mesenteric occlusion.

At 0700 it appeared the patient was going into acute renal failure. There appears to have been an ICU ward round at 1000 and mention that "the surgeons are discussing with another hospital re possible transfer". There was a conference with the family at 1200 and the essentially hopeless situation pointed out to them. Laparotomy appeared to have been offered as a way of confirming the nature of the expected pathology. Laparotomy was performed that afternoon, the patient being returned to intensive care later in the afternoon, the patient dying a few hours later. Operative findings confirmed almost total gut and liver ischaemia consistent with the clinical diagnosis.

Comments:

"Occlusion of the mesenteric vessels is apt to be regarded as one of those conditions in which the diagnosis is impossible, the prognosis hopeless and the treatment almost hopeless." Cokkinis 1926.
This quotation elegantly describes the passage of this unfortunate patient.

(1) Diagnosis

With the wisdom of hindsight the patient's initial presentation probably should not have been blamed on diverticulitis. Some of the features previously highlighted raising other possibilities. As it was the diagnosis appeared not to be made until the CT scan done at 2000. It was to be noted that the patient had by then had symptoms for five days although had been in Hospital care twelve hours.

(2) Management

It is highly likely that at the time of presentation this lady's bowel was irrevocably ischaemic given the delay and the mode of presentation. I strongly suspect that by this time (midnight 12/07/07) the patient's fate was sealed. I am little unclear therefore in this particular

case why transfer from Hospital 1 to Hospital 2 was achieved. To the best of my knowledge and on examination of the notes no interventional treatment was available at Hospital 2 and it is difficult to imagine much benefit for the patient that could be anticipated from the transfer. I have no comments about the quality of the resuscitation other than that perhaps it went on for a little too long. The decision to operate seems to have been an appropriate manner and I would have no quibbles with the decision to perform a laparotomy to confirm the diagnosis and the hopelessness of the situation. It was clearly futile from the beginning.

(3) General Discussion

Underlying the first line assessor's concerns is the question of whether some sort of vascular intervention should have been considered.
This literature does contain a series of cases where embolectomy on the bowel has been performed with apparent success.

From my reading of such cases (I have no personal experience) it would appear that such intervention needs to occur perhaps within twelve hours of the onset of the symptoms. Bearing in mind that this patient appeared to present to medical care four days after her symptoms initially started, a period of at least twenty four hours occurred in hospital care. It would not appear that even in a perfect world in centres with very special experience and enthusiasm that this lady's life could have been changed in any way. I would be interested to know what the comments were when this was discussed with the Victorian major teaching Hospital. Given the recent widespread availability of CT mesenteric angiography I suspect this is an issue that will be coming increasingly important over the next few years.

Delay in management of fulminant cholangitis

Summary:

An 80-year-old man presented to a metropolitan hospital emergency department in the evening with a three-day history of epigastric pain. Significant co-morbidity was present including ischaemic heart disease, anticoagulation for an aortic valve replacement, and chronic renal failure. His previous management however, had been at another centre, and the details of his history were not readily available. On assessment he was found to have upper abdominal tenderness, tachycardia, leucocytosis (22), and obstructive liver function tests. He was secondarily assessed in the Emergency Department by a Medical Registrar and the night surgical registrar. A provisional diagnosis was made of large bowel obstruction, despite a normal abdominal x-ray. Not withstanding, appropriate preliminary investigations were performed, and antibiotic therapy commenced prior to admission to a surgical ward.

The surgical unit resident medical officer assessed the patient in the morning, and the need for laparotomy correctly identified. During the course of the day the condition of the patient rapidly deteriorated with oliguric renal failure, and worsening coagulopathy. An abdominal CT scan demonstrated a sub hepatic collection, and blood factor correction of his coagulopathy was instituted. This phase of treatment is well documented by the consulted medical unit, and junior surgical staff. There is however no documentation that reviews by senior surgical staff occurred, although doubtless this was the case.

By the evening following admission the condition of the patient had deteriorated to the point of hypotensive collapse, and an emergency response team was deployed ("Code Blue"). Again, the senior surgical assessment is not recorded, but emergency surgery was arranged, and took place just prior to midnight. The surgery was performed by the consultant, with experienced assistance. Perforated suppurative cholecystitis was found, and very difficult haemostasis necessitated intra-abdominal packing. The patient was inotrope dependent, and ventilator dependent at completion of cholecystectomy. Progressive multi-organ failure ensued, and the patient died within twenty four hours in the presence of his relatives. The coroner attended, and the issued death certificate accepted without autopsy being requested.

Comment:

I do not consider that there was any preventable adverse event that contributed to the outcome. Death from the sepsis associated with severe perforated cholecystitis in an elderly anticoagulated patient with significant co-morbidity was all but inevitable. Although immediate laparotomy would have been ordinarily indicated, this was clearly inadvisable in this patient without adequate preparation. The fulminating nature of the sepsis precluded such preparation, and the prospect of recovery, almost nil.

The only cause for consideration was in the documentation of the surgical decision making process. The experience and seniority of the surgical staff involved in the decision making process was far from clear. There was however no evidence of poor management that may have contributed in any way to the outcome.

Delay in managing haematemasis avoidable

Summary:

A 53 year old man with type II diabetes was admitted to a peripheral metropolitan hospital with haematemasis. He was transferred through to a teaching hospital where he was assessed by a surgical registrar at 2230. Between the initial assessment at the peripheral hospital and in the teaching hospital the haemoglobin had fallen from 85 to 67. The patient underwent an endoscopy immediately and a large ulcer in the second part of the duodenum noted. There was no fresh blood, but a lot of old blood in the stomach and duodenum. The ulcer was injected. During this period four units of packed cells were given. At 1800 the following day the haemoglobin was still 62. Three further units of packed cells were given during the late evening and at midnight a further haemoglobin was 81.

During the next twenty four hours he remained stable, but in the middle of the afternoon (some fifty six hours after his endoscopy) he was found to be hypotensive, unresponsive, cold and clammy. He was given some crystaloid, bloods were ordered and a surgical referral requested. The intern noted that a stool chart should be started.

Shortly after this he was reviewed by the general surgical registrar who also noted him to be pale and sweaty with cool peripheries and a blood pressure of 105/60. He recommended that further bloods should be taken, PPI started and the patient should be referred to the nurse special unit. The surgical registrar noted there might be a requirement for a further repeat scope. The nursing entry made immediately after this, some forty minutes later, recorded that prior to the transfer to the nursing special unit the patient passed frank blood rectally. Ninety minutes later the patient arrested in the anaesthetic bay whilst an attempt was being made to obtain further IV access.

Comments:

This gentleman should have undergone surgery earlier. Twenty four hours after his initial scope he had seven units of blood and still had haemoglobin of 81. The pictures in the notes show a very large ulcer with a necrotic base and injection therapy must, at best, been difficult.

Although this gentleman had type II diabetes he was otherwise fit and well and relatively young. There was clearly a failure by the gastroenterologists to appreciate that this gentleman was at high risk of bleeding, there was delay in consulting the surgical team and I can not help but to come to the conclusion that this was a potentially avoidable death. I certainly think the gastroenterologists and surgeons in the hospital concerned need to review what happened.

Delay in the management of large bowel obstruction

Summary:

An 81 year old gentleman with a past history of Alzheimer's disease, total hip replacement and TURP (transurethral resection of the prostate) who had been residing with full care in a Nursing Home was referred by his General Practitioner to the Emergency Department in the evening because of a four-day history of increasing constipation and abdominal distension. He was seen by the surgical registrar who felt that he had a distal large bowel obstruction with the abdominal x-ray showing dilated loops of small and large bowel with gas going through to a cut off at the sigmoid colon. It was not clear whether this was due to a mechanical obstruction or a pseudo-obstruction. Resuscitative efforts with I.V. fluids and naso-gastric tube decompression were instituted.

He was reviewed the next day by the surgical team who recommended a CT scan. This was performed later that afternoon and the formal report issued on the following morning, indicated that there was a high grade obstruction in the sigmoid colon most likely due to malignancy. It is not clear from the notes whether there was any clinical review on that day and conservative management continued.

Three days after admission he was reviewed by the surgical team again in the morning and a decision was made to refer to Colorectal Unit for definitive surgery. Although this referral was made he was not seen until the next morning by which stage his condition had deteriorated. Bowel prep was commenced on that morning and theatre booked that evening, but before he could be taken to theatre he deteriorated suddenly on the afternoon of the fourth admission day and developed acute cardiopulmonary failure most likely from aspiration and died shortly afterwards.

Comment:

Setting aside the fact that this gentleman was very old, very frail and very demented there does appear to have been a significant delay in both the diagnosis and treatment of his condition. There are several viable alternatives in the treatment of large bowel obstruction short of full laparotomy and resection. Intraluminal stenting by colonoscopy is now available and even a de-functioning loop transverse colostomy can be performed under local anaesthetic with sedation on even the most moribund patient, so it does seem a shame that any patient should be allowed to die with an unrelieved obstruction.

If a General Surgical unit who are on take feels that the management of a condition like large bowel obstruction is beyond their remit they have an obligation to make

sure that the referral to an appropriate unit is made speedily so that further delays are not encountered. The advisability of giving bowel prep in a high grade obstruction, even with a naso-gastric tube in place, is also questioned.

Delay to surgery undertaken by registrar

Summary:

This is a case of a 60 year old previously well male presenting with acute staphylococcal endocarditis affecting the mitral valve. There was also neurological dysfunction from septic cerebral emboli present from the time of presentation. However, the patient was not so disabled as to require hemodynamic or ventilatory support prior to surgery.

Comment:

There are several areas of concern.
1) The documentation in the notes is particularly poor given that this case is going to be a difficult case to manage from the beginning and quite likely to be associated with considerable morbidity and possible mortality.
2) The timing of surgery and why surgery was performed so late is unclear.
3) This surgery should have been performed by a Consultant, at the least by someone who has FRACS in cardiothoracic surgery.

Expanding on these points:
1) Despite the diagnosis been made by the neurology team on the day of admission and a request that CT surgery be involved, I cannot see any documentation that CT surgery was actively involved up till the day before surgery. This is a surgical emergency; this is a disease mandating active surgical involvement from day 1. A surgeon must be involved particularly as the organism involved was know quite early to be a Staphylococcus, the occurrence of multiple embolism was documented and it is clear that there is left ventricular failure.
2) The transthoracic echo the next day documents vegetations, no mention is made of size, yet the patient is "very unwell" and the procedure was difficult to perform. The cardiologist states the prognosis is "guarded" given the cerebral state. Again there is no documentation as to what the surgical input is. A TOE is done 5 days later, large vegetations are seen and the patient begins to be prepared for surgery. I would argue that the TOE should have been done much earlier if the transthoracic (as stated in the notes was sub-optimal). It appears the TOE findings triggered the process of surgery. Clinically, why the patient was not considered for surgery earlier or why a TOE was not done earlier is sub-optimal.
3) The surgery was performed by a registrar who does not have Australian specialist recognition. A technical problem arose, which required a further period of cardiac cross clamp, a different approach to the mitral valve and the patient was left with a recurrent leak from mitral prostheses. The period of cardiopulmonary bypass and aortic cross clamp was extremely long. This is a difficult operation in a very sick patient, all the more why it should be done by the most experienced and/or capable surgeon available. It reflects poorly that a technical problem occurred and this was not fully repaired. It certainly can occur in the best of hands; however that is not the case, from the documentation, in this case.
This patient died from many factors, one of them being the consequences of having multiple cerebral infarcts. The need for a procedure which requires bypass is going to always be associated with the risk of the cerebral injury being aggravated even fatally so. However, delaying surgery, when there were clear indications that this man was already meeting accepted criteria for such surgery, meant that the risk of further patient deterioration was going to be likely and that further emboli were likely to occur. Hence an earlier TOE would have been helpful. If there were large vegetations present on the day of admission, the time of the transthoracic echo, the case for surgery would be, in my view irresistible. Importantly there is no documentation that this was contemplated; a clear plan of action as to what would trigger the need for surgery versus ongoing medical management is not made clear at any stage. Thus it is very unclear as to what made the decision to do a TOE at all and so late as, the findings, it clearly triggered the process of proceeding to surgery.

There is no documentation that cardiothoracic surgical expertise was actively involved from the outset in what is clearly a surgical problem.
The absence of a Consultant actually performing this difficult surgery in a very sick patient is unacceptable. This is not a common condition. That technical misdemeanours occurred are thus not unexpected. The point is, it reflects poorly on the institution. The best person should have done this operation; this is not a case for a registrar to do and by the notes to do alone.

Unrecognised haemorrhage following laparoscopic sterilization

Summary

A 41 year old female with a history of cirrhosis secondary to Hepatitis C and alcohol abuse died from multiple organ failure and bowel necrosis subsequent to a laparoscopic sterilization complicated by massive unrecognized haemorrhage.

Shortly after arriving in recovery ward (1620) her BP dropped from 135/80 to 100/60. Her pulse was unaltered at 70bpm, 0_2 sats 99% (0_2 6 l/m). At 18:15hr her BP, which had fluctuated to a low of 90/50, dropped further to 60/

40, O_2 sats 85% (O_2 6 l/m). Her pulse subsequently rose over the next hour to 106 bpm.

A doctor was notified of these observations at 1855, nearly two and a half hours after the patient had arrived in recovery. An RMO first assessed the patient at 1950, well over three hours after leaving theatre. Observations at that time were BP 72/45, O_2 sats 92% (O_2 6 l/m) pulse rate not recorded but last noted at 106 bpm. Normal Saline (250 ml) was administered stat and a litre was to be run through quickly. The patient was then transferred to the ward with no observations being recorded for the 40 minutes between recovery and arrival in the ward (2025). Her BP was unrecordable after arrival in the ward with the first observations, and the MET was called 20 minutes after reaching the Ward (2045).

The patient's abdomen was distended; she was conscious but confused with a pulse of 120 bpm. An ultrasound was ordered and demonstrated fluid in the peritoneal cavity. A laparotomy was performed 75 minutes from the time of the MET call (2200). It appears from a combination of the anaesthetist's observations and the inadequate surgical notes that the mesenteric vessels had been perforated as well as the bladder with the abdominal cavity containing at least 4 litres of blood. Subsequently the patient developed a coagulation problem with organ failure and bowel infarction, found at a subsequent laparotomy, which was so extensive that it was not amenable to resection. She died five days post-operatively from multiple organ failure and bowel necrosis subsequent to a laparoscopic sterilization complicated by massive unrecognized haemorrhage.

Comments:

The anaesthetist should have been notified when the BP dropped shortly after the patient's arrival in the recovery room. Although one would not expect action at this time it would have been the first alert of a developing problem. With the second drop in BP at 1815 the anaesthetist should have been notified again and he in turn should have advised the surgeon. The surgeon, not a junior doctor, should then have attended the patient. He may have detected her abdominal distension by that time and probably suspected the presence of haemorrhage. The failure to diagnose haemorrhage by the RMO who finally attended the patient is the most significant cause of the delay (4 hours) which led to this patient's death. As indicated above experience is needed in these circumstances and is why the responsible surgeon should have seen the patient at this time.

Although photos were reported to have been taken at the time of the original operation none were available for review. Misadventure must have occurred at the sterilization but the description by the surgeon of his findings at the first laparotomy of "a bleeding arteriole in the omentum" was disingenuous.

It is not possible to know what the surgeon did at the second operation (the first laparotomy). If as the anaesthetist contends that a mesenteric vessel was involved did the surgeon inadvertently tie off a mesenteric artery and contribute to the infarcted bowel?

Remedial suggestions:

All surgeons make mistakes from time to time. Failure to recognize them and to act decisively is essential to prevent fatal outcomes as this case demonstrates.

In these pressure situations the more time that a surgeon has to consider the nature of these problems the more likely a correct conclusion is reached. The earlier that the surgeon is told of a possible problem the longer he has to observe the course of events. This requires team-work and an understanding between the nursing staff and the medical theatre team. Doctors often get impatient with the nursing staff for notifying them of changes in BP etc. This discourages good communication and such attitudes if present here could have been responsible for the delay in the nursing staff notifying the doctor. On the other hand if the surgeon was not been told of the patient's condition until quite late in the process he may not have had time to assimilate the seriousness of her condition.

Transfer to tertiary hospital may have been helpful

Summary:

This 78 year old lady was admitted to a regional hospital with a distended painful abdomen. She looked unwell and had a white cell count of 16,000 and a CRP of 358. She was initially thought to have an obstructing large bowel mass and a CT scan was performed of the abdomen. This was performed soon after admission to hospital and revealed a right psoas collection with a maximum diameter of 60 mm. It extended vertically for 154 mm and there was component extending anteriorly to the right sub hepatic space and an inferior component extending into the pelvis. The sub hepatic collection measured 81 mm by 67 mm and had a small amount of loculated gas within it. It was also noted that the lower pole of the right kidney was atrophic. Posterior to this atrophic kidney was a perinephric abscess measuring 23 mm by 29 mm. There was no evidence that these abscesses had been seeded by infection within the vertical column.

A preoperative assessment performed the following day noted that she was frail and gave her an ASA score of 3E. The operation notes indicate that a right grid iron approach was taken near the anterior axillary line. Through this approach the abscess was entered and one and a half litres of pus and blood was evacuated (a specimen was sent for microbiological assessment). Collections in the perinephric sub hepatic and ilco psoas

region were drained and 32 and 36 French drains were inserted into the abscess cavity. In addition, it appears that a drain was inserted in the sub hepatic space. The surgical procedure lasted for about an hour and the subsequent report from the microbiology department suggested that the pus contained Citrobacter sp.. A blood sample indicated a haemoglobin of 72 and a transfusion was commenced in the recovery room. In addition the anaesthetist used Aramine during the procedure to maintain the patient's blood pressure. In all, the patient received three units of packed red blood cells, but a central venous line was not inserted at the time of anaesthesia.

The patient was transferred back to the High Dependency Unit about three hours after completion of the operation. At that time, the patient was hypertensive (85/30) and had a pulse rate of 115. Two hours later the patient had a cardiac arrest. The patient was resuscitated and regained sinus tachycardia. The patient was then ventilated and placed on noradrenalin. Arrangements were made to transfer to a metropolitan hospital Intensive Care Unit, but the patient was thought to be too unstable. The family was involved in discussions and decided against further resuscitation or transfer to a metropolitan hospital. The patient died about eleven hours after the completion of surgery.

Comment:

Was the collapse in the High Dependency Unit preventable? There is an incongruency between a clinical history of being unwell for forty eight hours and the presence of copious pus at multiple sites within and adjacent to the peritoneal cavity. Although this is an unusual and extreme set of circumstances, it did not trigger an impending sense of doom with the attending surgical staff, physicians, or anaesthetist. If there was a window of opportunity of a better outcome for the patient, which is only speculation, it would have been in the preoperative period. At that stage transfer to a teaching hospital would have at least ensured that the attending staff was conversant with the management of sepsis in a frail elderly patient. Once the decision had been made to perform surgery at the regional hospital, then the outcome was unavoidable. The drainage of such voluminous amounts of blood stained pus is associated with bacteraemia and it is this that lead to the patient's demise.

The patient was not transferred to a teaching hospital prior to surgery, presumably, because there were no overt signs of sepsis prior to surgery. Under these circumstances, it is difficult to be critical of the failure to transfer the patient to a teaching hospital. Whilst it is true that in retrospect there are aspects of the patient's post operative care that were not ideal, I do not believe that they contributed in any way towards the patient's death.

Death from undiagnosed urosepsis

Summary:

A 67-year-old diabetic man with a past history of ischaemic heart disease was admitted for elective bladder neck incision and removal of a bladder stone. He had previously undergone a TURP (transurethral resection of the prostate) the previous year.

Preoperative urinalysis demonstrated blood and white cells. No formal MSU (mid-stream specimen of urine) had been taken preoperatively. It had been decided by the pre-admission nurse at the hospital that the patient did not require pre-admission assessment.

He was given Gentamicin on induction. He then underwent a bladder neck incision using a Mercedes technique with incisions at 12, 5 and 7 o'clock. Catastrophic bleeding was encountered and the procedure was abandoned with the stone left in the patient's bladder. A urethral catheter was placed to tamponade the bleeding and the patient returned to the ward.

Approximately three hours post procedure he became hypotensive and tachycardic. Possible sepsis was recognised and he was given intravenous cephalosporins and transferred to the intensive care unit. He was placed on inotropic support and, despite having cardiac and respiratory failure on admission, appeared to improve over the first twenty four hours.

By the next morning, blood culture results, and urine culture results taken from the previous day demonstrated E. coli.

On the second morning in intensive care, he appeared to be improving with reducing inotropic requirements. He was given fresh frozen plasma for mild coagulopathy and reduced platelets. He suddenly deteriorated on the afternoon of his second day of ICU admission and was unable to be resuscitated. Post mortem was refused by the patient's family however a coroner's report stated that the most likely diagnosis was of AMI (acute myocardial infarction) secondary to gram negative sepsis and subsequent multiorgan failure.

Comment:

This patient suffered an adverse event, and there are several areas where comment can be made regarding preoperative assessment and operative technique.

The decision for the patient not to have a preadmission assessment, and therefore a lack of preoperative MSU, are areas for concern. Treatment with antibiotics of his E. coli urinary infection prior to his admission to hospital and surgery may well have altered the outcome for this patient. It is increasingly difficult to ensure that

patients do have appropriate preoperative investigations in an era of increasing utilisation of day of surgery admission. However this does not excuse a lack of appropriate investigation, and should be followed up by the hospital and surgeon involved.

The operative technique utilised in this situation is also an area for consideration. It is widely recognised that incisions at 12 o'clock, particularly post TURP, have a high risk of entering the dorsal venous complex and being associated with catastrophic bleeding (Blandy, Transurethral Resection 2nd Edition). This is in fact, what occurred in this case, exposing the patient to direct venous exposure to infected urine. Incisions at five and seven o'clock, which might be considered more standard treatment, would have been less likely to precipitate this event.

Once the patient's condition deteriorated, the standard of record keeping, and further management in the intensive care unit were excellent.

Delay in repair of fractured femur

Summary:

A patient was admitted to a major teaching hospital with a fractured right neck of femur. He was a nursing home resident ambulant with a Zimmer frame. He had fallen in the process of doing up his shoelaces and was found by the nursing home staff within a few minutes of his accident.

His previous history included deafness, transient ischaemic attacks, mild dementia, hypertension and chronic obstructive airways disease from being an ex-smoker. His examination findings were largely unremarkable from a general sense, aside from a loud ejection systolic murmur and the obvious signs of a fractured hip and he was found to have a regular heart rate on ECG, which was thought to be atrial fibrillation. He was also noted to be hyponutremic with sodium of 129 and a slight raised white cell count of 12.

He was offered for surgery on the day following his admission but an anaesthetic assessment suggested medical review. His surgery was held off pending this review which occurred on the day following admission. The main findings being, possible aortic stenosis, hyponutraemia and ECG findings. It was felt that he should be assessed with an echocardiogram prior to surgery. This was not requested until later that evening and it was not until the next day, now forty eight hours after admission, that he underwent the Echo. The report indicated thickening of the mitral valve and aortic valve with decreased mobility suggesting moderate stenosis of the latter. There was a follow up review by an Orthopaedic Geriatric Registrar after this test on the following day, now seventy two hours after admission. There had been no major changes to his U & E profile despite treatment.

He finally underwent his procedure, which was a right hemiarthroplasty after four days . Prior to his surgery that he had spiked temperatures of thirty eight degree Celsius on more than one occasion. Post operatively, as early as a few hours after his surgery, he had a temperature of thirty nine degree Celsius with difficulty breathing. Investigations revealed a left lower lobe pneumonia presumed to be from aspiration. His white cell count went as high as 65 when initially 12 on the pre-operative check. His urine output decreased and it was presumed he was in septic shock. He was treated with I.V. antibiotics and other supportive measures and was minimally responsive at this point in time.

Day two after surgery it was noted that he had U.T.I. consisting of Enterococcus.

It was noted on day three post surgery that he was experiencing chest pain and had increasing shortness of breath. There were ECG changes with ST elevation and AF . He had a troponin rise demonstrated of 1.5. After discussing the situation with relatives it was made clear that this gentleman was not for resuscitation. His condition gradually improved over the next few days. A Gallium scan suggested infective endocarditis. His condition continued being treated with what appeared to be a gradual resolution of symptoms. A total of twenty one days after his surgery he again deteriorated. He became poorly responsive to stimuli and increasingly drowsy. The precise reason for this deterioration was not identified but felt to be perhaps to be further aspiration. In view of this gentleman being not for resuscitation, supportive care was instituted and he passed away within a short space of time.

Comment:

Overall I feel this gentleman's care was mostly appropriate according to his pre-operative assessment and given this gentleman's advanced age and status as a nursing home resident with dementia. His prognosis with regards to his injury and co-morbidities was poor in any case. It appears that he has had difficulty with aspiration, pneumonia, possible infective endocarditis and maybe complications thereafter.

I do not believe there are any concerns with the nature of his procedure or the surgical expertise of the surgeon carrying out the procedure. It is possible that a delay prior to him undergoing surgery could have been less. I do not believe the reasons for delaying his case were particularly strong given that no major changes in the medical management were made and the delay of four days may have affected his overall recovery to some degree.

Secondly this gentleman had a fever when he underwent the surgery and this may have come about through complications from the delay getting to surgery but in any case it was not considered a reason to delay his case where as investigations performed pre-operatively were used to delay things instead.

Thirdly, aspiration following surgery has mostly likely occurred here and I wonder whether there is an issue from the point of view of his anaesthetic care and recovery observation in this regard. I believe that this gentleman's outcome may not have been altered by the areas of concern even if things had been maximised. It is quite possible other complications and difficulties may have arisen.

Long delay before surgery for large bowel obstruction

Summary:

An 81 year old gentleman presented to a regional hospital on two occasions in the week prior to surgical intervention. On the Day 1 the patient presented to Emergency Department at the regional hospital with a story of some abdominal pain, absolute constipation for twenty four hours and no bowel action for eight days. Standard observations at the time were perfectly normal. An enema was given with some benefit and the patient was discharged home.

The additional intervention was that he was put on a liquid laxative and asked to be reviewed by his General Practitioner in two days. It would seem that the patient returned to the hospital four days later about midday with distension and abdominal pain. There is not a great deal of documentation that I can view from that time. However, an abdominal and chest x-ray performed on the fourth day and reported the next day suggesting a relatively straight forward and normal chest x-ray. A plain film of the abdomen was consistent with a large bowel obstruction with an incompetent ileo-caecal sphincter and the obstruction suggestive on the plain film of being low in the left side of the abdomen.

An entry in the notes for ward transfer was undertaken late on the fourth day and the notes were entered very early on the morning of the next day bringing attention to abdominal pain and distension and that an enema had been given in the Emergency Department with some positive result. A naso-gastric tube was inserted and analgesia commenced. On the morning of the sixth day a ward round was undertaken by the surgical staff and another enema ordered of picoprep. The General Practitioner visited at that time and suggested care should be taken with fluid balance. On review that evening by the Consultant, the patient's bowels had worked, the patient was thirsty and oral intake recommenced. On the ward round the following morning it was noted that the abdomen was still distended though the patient said he felt well and the naso-gastric tube was removed. It would appear about that time a small bowel series was ordered and some oral contrast administered. However, that night the patient's condition, it would appear, began to deteriorate somewhat in that oxygen saturation's fell, pulse began to rise and blood sugars were at the upper end of normal. The Medical Registrar was asked to review as to fluid balance status, and radiology was again requested. The morning Ward round on the seventh day noted that the patient was feeling much better. The ward round was unable to obtain views on the sigmoidoscopy consequently a bowel prep was organised. Barium follow-through on the third day after admission suggested there was obstruction on the left lower side of the abdomen. Some time in the afternoon the Consultant again did a ward round and a decision was made that surgery was required. However, transfer to a metropolitan hospital was the preferred treatment option. I do not see that there could be any issue with the transfer as the aeroplane was obviously pressurised to sea level and at 2015 in the evening the patient was assessed in the Emergency Department at the metropolitan hospital where a surgical team were informed. A C.T. was organised and Intensive Care Unit contacted. The C.T. again reinforced the case for low left sided obstruction.

The patient was taken to the operating theatre at about 0045 and the anaesthetic was completed about five hours later. A near total colectomy was performed and an ileostomy fashioned. Of note was the extremely large transfusion / re-hydration administered with five litres of crystalloid, four litres of gel fusion, six units of packed cells and four units of FFP. On admission to the country hospital the patient did have significant renal impairment and blood test taken early on the day of admission revealed a creatinine of 250 micromols per litre, about double the upper limit of normal range. This improved a little over the admission prior to the transfer, suggesting a degree of dehydration adequately treated prior to the transfer. At operation an incidental lymphoma was noted and biopsied.

Subsequent to the operation it is obvious that the patient struggled somewhat. The patient slowly deteriorated and passed away about six days after his surgery.

Comment:

I have reviewed the notes on the patient and I do not want to nit pick. However, on the surgical case form filled in by the responsible surgeon there are a couple of points which do not seem to add up. I know that overall they probably do not make a lot of difference but it might mean that some record keeping may need to be adjusted.

On Page one of the surgical case form (item four) suggested there were no other co-existing factors

increasing the risk of death. However, age was not ticked nor was diabetes, both which I think should have been, as that would then help substantiate why there is the ASA Grading of four. Likewise a significant degree of cardiac and renal disease was co-existent as revealed by the elevated creatine and the General Practitioner's note of previous cardiac failure and an operative finding of lymphoma.

There are only two points that I can see that need to be raised. The first and obviously overwhelming most important, is that the x-rays taken on the day of admission and the day after suggested that this was a distal large bowel obstruction. I am not sure what was going through people's minds when oral contrast was administered to delineate the site of pathology when it would have been much safer and more timely to have approached this problem from the other end. I think there is only one person that could answer why the line of treatment that was pursued was undertaken in that fashion. Whether the x-rays were not brought to the attention of the treating doctors or they were simply overlooked is important because if the result had been known I suspect a different course of action may well have been undertaken. Interestingly we have a patient here who has actually declined to take some of the bowel preparation as he was experiencing abdominal pain and vomiting.

The last point I would like to raise here is the length of the operation. It would appear to have been an unduly lengthy procedure undertaken by a trainee of indeterminate experience. The fluids administered to this patient were indeed considerable and a normal haemoglobin pre-operatively and a transfusion of many units intra-operatively would suggest considerable bleeding. It may well be the case that when an operation on a man of this age and with the significant pre-existing conditions co-existed, rapid surgery would have been of upmost importance.

Apart from those two points I think anything else in terms of electrolyte and blood management cannot be really questioned in any way.

ANAESTHESIA

Choice of anaesthesia in a patient with respiratory failure

Summary:

An 88 year old man with incurable bladder transitional cell carcinoma had previously been treated with palliative radiotherapy for recurrent haematuria. He was admitted with recurrent bleeding, a urethral catheter was placed and bladder washout was commenced. He was also noted to have a non-reducible right inguinal hernia.

He has a significant past medical history including congestive cardiac failure, heavy alcohol abuse and respiratory failure with home oxygen dependency.

His haematuria failed to settle and the decision was made to proceed with cystoscopy and control of bleeding. A general surgical opinion was obtained regarding his right inguinal hernia and it was decided to repair it at the same time of his planned cystoscopy. Clinical examination was unremarkable apart from his haematuria and slightly reduced breath sounds over the left hemithorax. A chest x-ray obtained on day four post-admission showed a degree of atelectasis. His blood results were within normal range apart from a slightly reduced haemoglobin of 108.

He was assessed by the anaesthetist and it was decided to proceed under general anaesthesia. Note is made in the anaesthetic record that his previous cystoscopies were done under spinal anaesthesia.

His cystoscopy and hernia repair were uncomplicated. However, in the post operative period he became hypoxic, agitated with signs of heart failure. He was admitted to the high dependency unit and treated with diuretics and respiratory support. He improved initially but subsequently deteriorated with significant respiratory compromise and acidosis. He became increasingly agitated and fluid overloaded and his respiratory function deteriorated. After discussion with the family the decision was made to withdraw any active treatment and the patient deceased twenty two days after admission.

Comment:

I feel that indication for surgery in this patient is adequate. This patient has failed all other conservative options to control his bleeding and therefore his cystoscopy was warranted.

However, I believe that the choice of anaesthetic might have contributed to this patient's post-operative complications and subsequent death. He is known to have a significant respiratory disease and since he has had all his previous cystoscopies under spinal anaesthesia this would have been the obvious anaesthetic option.

Occult ischaemic heart disease

Summary:

A 77 year old man suffered a fatal cardiac arrest after a transurethral resection of bladder tumour. The area of consideration raised by the responsible surgeon and the first line assessor was whether a significant ischaemic heart disease problem could have been detected pre-operatively, which might have made a difference to the outcome.

The patient was assessed as an outpatient before surgery by the Urology Intern and by the Anaesthetic Clinic Nurse. It was noted that he did have a history of vascular problems in that he underwent an aorto-bifemoral bypass in 1984. There was the possibility that he had suffered a myocardial infarction in the same decade, but subsequent angiography was normal. There is no documentation to confirm the latter. He was an ongoing smoker of 10 cigarettes per day. He had had angina in the past, but not used a GTN spray for more than eighteen months. No note of exercise tolerance was made at this assessment. Appropriate investigations, including ECG, were carried out in the Anaesthetic Clinic. Apart from the lack of history on exercise tolerance, I would think that this was an appropriate workup for a man of this age about to undergo what is usually a relatively minor surgical procedure.

He underwent a transurethral resection of bladder tumour under general anaesthetic by a Consultant Urologist. This would seem to have been largely unremarkable and straightforward, although the recorded operative time of over one hour was perhaps slightly longer than average. ST depression was noted by the Anaesthetists on monitoring during the procedure. The patient was visited by the Anaesthetic Registrar immediately after the operation and he was noted to be well with stable observations and no complaints of chest pain. The Anaesthetic Registrar advised a follow-up by the Surgical Registrar and a repeat ECG that evening.

At 2130, the Surgical Resident duly visited the patient who had no complaints and was well with stable observations. A repeat ECG was carried out, which showed no acute ischaemic changes. I have not seen the ECG, nor a formal report upon it.

At 2220, the patient was found to be pulseless, not breathing and centrally cyanosed. The emergency resuscitation team was immediately called. The patient was noted to have electromechanical disassociation and after 30 minutes, attempts at resuscitation were pronounced futile and the patient died.

Comment:

The Anaesthetist saw the patient just before his anaesthetic. He was noted to be ASA grade three. No notes regarding ischaemic heart disease were made and no record of the patient's exercise tolerance was recorded. Although exercise tolerance can be a very effective, simple screening tool for fitness for anaesthesia, I doubt very much that omission of this aspect of the history in the pre-operative work-up would have made a difference to the decision to proceed to surgery and to the patient's post-operative course. In addition, I doubt that even if the patient had been monitored on HDU after the procedure that the outcome would have been any different.

There were two further points that my review of the clinical records raised. The first was that anti-DVT-PE prophylaxis was claimed in the form of prophylactic subcutaneous Heparin. I cannot find any record that subcutaneous Heparin was given to the patient before, during or after the procedure. This has no bearing on the outcome in this case, but the protocol for administration of Heparin as prophylaxis might need to be reviewed by the surgical team.

The other point was that the patient stopped his low-dose Aspirin therapy approximately one month before the procedure. This is counter to practice in our own unit. In the absence of good evidence in the literature that low-dose Aspirin therapy causes prolonged haematuria of significance after endoscopic resection of bladder tumour or prostate, we continue it.

If one takes TURP as an example, the peri-operative mortality is 0.5% and is invariably related to thromboembolic phenomena. Patients in this age group are often on Aspirin for the protection of their coronary and cerebral arteries and therefore it seems logical to us to continue treatment to maximise protection after a procedure which does result on a degree of hypercoagulation.

FLUID MANAGEMENT

Fragmented post-op management leads to poor fluid management

Summary:

A 80 year old female presented with pain in the neck and left hip after a fall at home. X-rays revealed a fracture of the neck of the femur. She had a history of Parkinsonism, hypertension and hypokalaemia (K 2.7). She was on a number of medications including Rosiglitazone which may rarely cause heart failure and pulmonary oedema. She was hypertensive on admission with a SBP of 225mm.Hg. She was triaged at 1830 on the day of admission and reached the ward at 0030 the following day (day 2). Her medications were charted at 0300. When reviewed by the intern 0940 she was hypertensive. An IDC was ordered along with IV fluids with potassium supplements. Later that day she was seen by anaesthetist who noted ischaemic changes on ECG and in consultation with staff specialist elected to use spinal anaesthesia for the insertion of a DHS. The surgery was uneventful and the patient returned to the ward at 2215 on day 2. She was seen by the medical registrar at 2300 because of hypertension SBP 225, and given Atenolol. She was seen by the orthopaedic team at 07.45 when a medical review was requested; then seen at 20.30 by the surgical intern because of low urine output. She was noted to have bilateral creps on auscultation of the chest and was considered at risk of aspiration. A diagnosis of dehydration was made and a fluid load given. She was seen later that day when a

chest X-ray was suggestive of pulmonary oedema. She was next seen at 0130 on day 3 by the intern still thought to be dehydrated and a fluid load given. The patient was reviewed at 0245 with poor urine output, prescribed Frusemide and more IV fluids. The nurses reported her as being confused and having trouble with swallowing. She was seen again on the orthopaedic ward round at 0730 and a check Hb ordered. She was next seen by the orthopaedic resident at 1220; Hb noted to be 77gm, she had noisy breathing and was disorientated. The nursing report notes marginal urine output. She was next seen by the orthopaedic resident when a chest X-ray showed the NG tube in place, cardiomegaly and possible pulmonary oedema. An intern reviewed her at 0415 on day 4 because of deterioration in her condition and noted a low PO2. A diagnosis of AMI with pulmonary oedema was made and Frusemide, Salbutamol and Morphine prescribed. The orthopaedic ward round at 0735 requested a medical consult. She was then seen by the Medical Registrar who prescribed GTN and IV antibiotics. The patient was then seen by a physician, but no further intervention provided. The patient died at about 1400 on day 4.

Comments:

The above summary is longer than I would have liked but it indicates many doctors were involved in the management of this patient. Not only does there appear to be a failure of continuity of care but there was an unreasonable reliance on junior staff. Earlier review by a specialist physician should have been obtained. This was sought at 0745 on day 2, but she was not seen until at least 24hrs later. The quality of the records is good. A review of the IV Fluid and Fluid Balance charts suggest that this patient received a fluid overload. I find it difficult to be sure but there appears to have been a positive balance of in excess of 2 litres in a 48 hour period but a diagnosis of dehydration was made.

This case once again highlights the problems of managing elderly high risk patients who present with a femoral neck fracture. Most of their problems are medical with surgery being an incident in their management. Ideally pre-operative review by a physician should be available together with post-operative care of the medical co-morbidities.

ANTI-COAGULATION

Problems with Anti-Coagulation

Summary:

A 70 year old male was admitted as an emergency from the Vascular Clinic to the Ward critical ischaemia affecting his left leg. He was a known diabetic with peripheral vascular, ischaemic heart disease, previous coronary artery bypass grafting and hypercholesterolaemia. He appeared to be fairly confused shortly after admission. The cause of the confusion was not immediately apparent. There was a suggestion that it might be due to sepsis, but antibiotics did not improve the situation. Indeed it may have got worse and he was seen by the psychiatry registrar and the suggestion was made that his confusion might have been due to polypharmacy. He did have an infected leg ulcer, but it seems unlikely that this was causing septicaemia.

There is some question regarding the timing of the surgery. Patients described as having a critical ischaemic leg require urgent, but not necessarily immediate surgery. An attempt was made to improve the patient's medical status prior to surgical intervention and a cardiological review was arranged some five days after admission. On the pre-operative day the patient was reported to be less confused and the pain in his left leg to have improved. I do not believe any earlier surgical intervention would have altered the outcome significantly in this case.

However, I am uncertain as to why the patient's aspirin was stopped on the day before surgery, presumably on the morning ward round and the patient was commenced on clopidogrel, along with subcutaneous heparin. Clopidogrel is known to be associated with significant bleeding in the post-operative and operative period and the majority of surgeons prefer their patients to have ceased this at least five days prior to operation. In addition, the administration of Clopidogrel may have added to the anaesthetic problems, as this patient was presumably likely to have a regional anaesthesia, rather than a general anaesthesia, because of his multiple co-morbidities. I note that a regional anaesthetic was used.

The graft occluded in the early hours of the morning of day 1 post-operative. It was decided at that time to institute a heparin infusion to fully heparinise the patient. I would suggest that this was inappropriate in a patient who had already had clopidogrel and had a fairly extensive operative procedure on his leg. I think the two options at this point in time would have been either immediate return to theatre to carry out a graft thrombectomy or leave things as they were until the morning and then proceed to a thrombectomy at that time. In most cases when the graft blocks, the leg is usually not significantly more ischaemic than it was pre-operatively. In some cases, due to the division of multiple collaterals this does occur and it is possible that the leg was acutely ischaemic. This needs to be assessed at that time.

If the leg was deemed to be not significantly different from the pre-operative state, then it would have been perfectly safe to leave any intervention to the next morning. If, however, the limb was confirmed to be acutely ischaemic, then intervention at that time would have been appropriate.

It would appear that after the administration of heparin there was significant blood loss as evidenced by blood in the Hemovac drain and also what is described as "+++" of bleeding from the left groin. His haemoglobin was noted on day 1 post-operative to be 71, so he had suffered a significant blood loss; his pre-operative haemoglobin being 102. That morning the ICU unit was notified. They felt the patient had had an ischaemic cardiac event, due to hypovolaemia and transfer to the intensive care unit was arranged. Resuscitation with transfused blood and inotrope support was commenced in intensive care. Further active measures were correctly deemed inappropriate.

Comment:

I note that the operating surgeon has commented that he felt the timing of the operation was too late, although I think he may be slightly hard on himself. He also felt he should have perhaps requested a definite ICU admission post operative. It sounds from the notes as if this was indeed discussed with the intensive care unit prior to the surgery.

In summary, I think the main points to be learned from this case is that it is not appropriate to commence Clopidogrel prior to an operation in most cases and that to fully heparinise a patient after a major procedure is not a minor matter, and any such decision should only be taken after consultation with the various medical practitioners involved in the patient's care. I believe as a result of the anti-coagulation, excessive bleeding led to hypotension and hypoxia, which caused the patient to have a cardiac arrest, presumably as a result of a myocardial infarction, as he had significant pre-operative myocardial disease.

Poor anti-coagulation leads to death in patient with undiagnosed terminal cancer

Summary:

A 74yr old female was admitted electively for carotid endarterectomy for a critical stenosis in association with moderate contralateral stenosis. She was moderately demented, and it was difficult to be certain whether her disease was symptomatic. This made her surgeon loathe to recommend an operation, but after discussion with the patient's daughter it was felt that the patient was having TIAs. The operation was apparently uneventful, but the same evening a wound haematoma developed and the patient was returned to theatre urgently, just before midnight (about 7hrs post operatively). On the second post-operative day a routine CXR showed right upper lobe collapse and a right pleural effusion thought to be suspicious of lung cancer. This diagnosis was subsequently confirmed. The prognosis was regarded as poor palliative care was commenced and the patient died 17 days post-operatively.

Comments:

The clinical notes, provided in PDF form from scanned images, are comprehensive, but are not easy to read in this format.

The surgical case form indicates that heparin and clopidigrel were used as DVT prophylaxis, but enoxaparin is first documented on a drug chart only on the 11th post-operative day and clopidigrel not at all. It seems unusual that heparin was started so late, and may well have been used earlier, but as stated I can find no documentation of this. In view of the bleeding problems here, it may well have been appropriate to withhold prophylaxis initially. The post-operative orders in the operation notes make no reference to DVT prophylaxis. DVT prophylaxis has to be adjudged an unresolved question in this case on the evidence available to me.

The 1st line reviewer identified two areas for consideration, as follows:
Area for consideration 1: Decision to operate
There are two separate issues within this. The first is whether to offer this procedure to a demented patient with uncertainty surrounding symptomatology. I can only say that the surgeon clearly recognised this in clinic letters, and was reluctant to operate. This seems appropriate. The second issue is the 'missed' lung cancer, which would clearly have contra-indicated the operation. Unless routine CXRs are ordered pre-operatively, this could not be avoided. Current guidelines do NOT recommend routine CXR, and this is supported by a recent systematic review (Joo HS et al. Can J Anaesth 2005, 52:557). In conclusion, whilst the operation did no doubt speed this patient's death, I do not think that this was reasonably foreseeable, or unreasonable.

Area for consideration 2: Post-operative bleeding
There was nothing to indicate that there was any technical problem with the first operation that might have contributed to the wound haematoma. The anti-coagulant usage does become relevant here. As already stated, this is unclear. The patient was on Asasantin before admission. It is not stated whether this was ceased for any period pre-operatively, but since the patient was thought to be having TIAs, it may well not have been. In conclusion though, there is no evidence that this was other than an unavoidable complication.

MANAGEMENT

Was surgery required?

Summary:

A 91 year old man with mild systemic disease was admitted for elective repair of a type II endoleak following bifurcated endoluminal repair of an infrarenal abdominal aortic aneurysm (AAA) three years

previously. (He had slight reduction of renal function - creatinine 138 - upper limit 110.)

This known endoleak had persisted since the original operation, which had required, one year later, an endoluminal . The endoleak was reduced, but had persisted.
The AAA remained at ten centimetre in size, having not reduced in size, as is the usual case in successful endoluminal aortic aneurysm endografts. There was no movement of the endograft.

He had no pain or discomfort due to the AAA. He had urinary retention due to recurrent benign prostatomegaly (previous TUR), and urethral stricture, corrected transurethrally.

Elective operation was carried out and lumbar arteries ligated, the neck of the AAA and the common iliac arteries at the bifurcation were explored. Inadvertent tears were made and repaired in the distal inferior vena cava (IVC). The thrombus in the AAA sac was evacuated, and the sac wall wrapped around the endograft.
However, bleeding continued postoperatively, requiring the patient to be taken back to theatre two hours later. There was generalised ooze, and a small rent in the left renal vein was repaired.
There was no bleeding or displacement of the endograft. Three packs were positioned within the aneurysm around the endograft, and the abdominal cavity closed.

Postoperatively, a large right tension pneumothorax required an intercostal tube drain, and the right lung re-inflated. He continued to be sedated and intubated. His renal function deteriorated. He had evidence of acute severe myocardial ischaemia. He had gastrointestinal bleeding, and continued to ooze from his abdominal incision. He required blood and platelet transfusions. He required a diuretic (lasix) and inotropics.
The three abdominal packs were removed in the operating theatre three days after previous operations - no bleeding point was seen.
His renal function continued to deteriorate, with increasing acute renal failure, and he developed worsening pneumonia. He was mentally confused and disorientated, with rapid clinical deterioration.
He deceased nine days following the operation.

Comment:

At 91 years of age, even with a very large ten centimetre AAA (no change in size or symptoms over past three years), was an operation - with a very high degree of risk - indicated for an asymptomatic large persistent AAA with an endoleak which had been present (but subsequently reduced by Endoluminal embolisation) ever since the original operation, three years previously? Would not a further minimally invasive endovascular embolisation/occlusive stent procedure have been trialled, in the first place, if any intervention was to be considered?

It was a difficult surgical procedure, where the exact bleeding artery was not specifically localised pre-operatively, and complications, rents in veins occurred. Should not a more experienced surgeon - the consultant - have been involved in the immediately subsequent re-operation for bleeding, especially in view of the severity of the circumstances?

Was surgery required for elective aneurysm?

Summary:

A 79 year old woman presented with a 5.9 (diameter) thoraco abdominal aortic aneurysm. She had a past medical history of breast cancer, coronary heart disease and an aortic valve replacement five years previously.

Despite these co-morbidities she seemed to appear reasonably well. The aneurysm was asymptomatic. Imaging could not be reviewed by this reviewer. However, it appeared that the aneurysm was not suitable for an infra-renal graft or stent and therefore a more complex procedure was required. The decision was made to perform a hybrid procedure which involved aorto-mesenteric grafting (an open operation involving a dacron graft from the distal abdominal aorta to the superior mesenteric, coeliac and both renal arteries). This was then to be followed by an insertion of an endoluminal thoraco-abdominal stent covering the origins of these important arteries. The first part of this two stage procedure was undertaken and although technically demanding and requiring about seven hours of operating time it appeared to be uneventful. Unfortunately within a few hours of completion it was apparent that the patient was bleeding in the abdomen and an emergency laparotomy was performed which revealed bleeding from the anastomosis between the aorta and the dacron graft. Ultimately this resulted in a significant coagulopathy and the patient died during the second operation.

Comment:

Medical Record
The lack of imaging report within the record made it difficult to complete this report.
As the patient died very shortly after admission little further can be commented on with regards to the medical record.

Areas for Concern
Alternative option to treating this patient may have been a fenestrated endoluminal graft. While these are technically demanding, when successful the morbidity and mortality is probably lower than the two stage procedure that was undertaken. As the imaging was not available (it could not be found on PAX) it was not

possible to ascertain whether the anatomy of this aneurysm lent itself to endoluminal fenestrated graft.

An area of concern lies in the decision to repair this aneurysm at all (be it endoluminally or open). The maximum diameter was only 5.9 which in an infra-renal abdominal aortic aneurysm would be large enough to warrant surgery, but in a thoraco abdominal aneurysm may not be large enough as the risk of rupture probably does not outweigh the risk of intervention. In particular the patient had relevant co-morbidities including coronary heart disease and renal impairment (creatinine 142 μmol/L per litre). It may be that the patient had some symptoms attributable to the aneurysm (not apparent from the medical record) or that the patient was particularly keen on having the aneurysm repaired (unlikely). Estimating the risk of mortality with this kind of procedure is difficult but a peri-operative mortality of at least ten percent should have been quoted.

Elderly patients undergoing prolonged surgery easily decompensated

Summary:

A 82 year old diabetic and known arteriopathy presented at a peripheral hospital with cellulitis and ulceration of the right hallux. He had previously been a patient at a metropolitan hospital and assessed as requiring reconstructive surgery to improve perfusion of the right foot. Following his presentation at peripheral hospital, he was transferred promptly to the metropolitan hospital, on the assumption that antibiotic therapy alone was insufficient to treat the cellulitis in the presence of ischaemia.

Following his admission to the metropolitan hospital he was assessed by the general and vascular surgeons. Based on his previous visits as an outpatient. During his previous assessment, he was investigated and found unsuitable for a minimally invasive procedure such as angioplasty and the decision to operate was taken fairly rapidly. This raised the option of proceeding directly to below knee amputation. This had been considered and discussed with the family and presumably rejected as primary choice. However it remained a possibility in the event of failed therapy.

These preliminary investigations had identified vascular disease not only distally in the leg but also in the common iliac artery. This indicated the need for complex and extensive reconstructive surgery. The patient appeared to have been evaluated with this in mind and no concern is recorded in the notes in regard to his ability to undergo this type of surgery.

At the commencement of operation, he underwent angiography to assess pathology within the common iliac artery. This was not significant and did not require intervention. Attention was then directed to the distal disease. The operative notes report the performance of an in-situ graft from the common femoral to the peroneal artery. At the end of the operation, the bypass appeared to be functioning poorly and this did not improve following various manoeuvres. The proximal part of the conduit was then replaced with synthetic PTFE. The residual autogenous graft, anastomosed to the peroneal artery, was preserved thus producing a composite graft.

At the termination of the operation the perfusion of the right leg and foot appeared adequate although this is not directly stated in the notes. The operation notes also do not record the amount of blood loss etc which may have occurred during the procedure. The post-operative instructions are fairly basic. Following transfer to the ward, the patient appeared to be reasonably stable with adequate perfusion of the re-vascularized limb. Bleeding was reported from one site in the wound but this did not appear to be major.

Within twelve hours of the completion of the operation the patient became acutely breathless and hypotensive with ECG change. Clinical notes record review by the night resident. It does not appear that any action was taken until review by the vascular team. Coronary Care consultation was arranged on the assumption that the patient had sustained myocardial infarction.

During the three hours or so of assessment and decision making and prior to transfer to the intensive care ward, the patient arrested and could not be resuscitated.

Comment:

It is not uncommon for patients of the age and fitness of our subject to undergo prolonged reconstructive vascular procedures for acute limb ischaemia. These procedures are prolonged due to technical and logistic difficulties related to disease in target vessels and the lack of a suitable conduit. In addition such patients may sustain significant blood loss. This may be at a low level. However the length of the procedure results in a significant total loss.
This situation may well apply to this patient. He appeared to have received a significant amount of blood and colloid during the procedure - up to seven litres of colloid and two units of blood. The operation notes do not record significant blood loss. In addition he received pre-operative infusion of saline, presumably to administer intra-venous antibiotics. The presumption is that he required this amount of transfusion to compensate for blood loss. Alternatively the need for transfusion may signify early de-compensation.

I note that an epidural anaesthesia was initiated and later transferred to general anaesthesia. Continued epidural infusion may have reduced his peripheral resistance and this may have been a factor in his need

for large volumes of colloid to maintain adequate perfusion.

Given all these issues and the time which the operation was completed the option of prophylactic admission to high-dependency or intensive care unit would deserve consideration. This may have occurred but this is not recorded in the hospital records. The lack of critical assessment immediately after operation, such as would occur in an intensive care or high dependency unit, does leave a void in the assessment of factors leading to the sudden dc-compensation and death. The assumption is that he sustained a significant myocardial ischaemic insult. However it is very difficult to know whether issues such as over transfusion, hypoxia etc contributed to his acute decline.

Areas for Consideration

There are a number of areas which could be valuable for consideration.
1) Pre-operative assessment and whether the operative anaesthetic team considered either before or during the procedure whether the patient was sufficiently high-risk to be managed in a high dependency or intensive care unit.
2) Considering the duration of the procedure and the need for very significant fluid replacement whether the medical staff on duty in the hospital had been sufficiently appraised of the potential seriousness of the patient's medical condition. This includes attention to oxygen saturation, urine outputs, electrolytes etc. While it is likely that verbal communication took place to ensure that adequate monitoring was carried out, this is not recorded in the notes and therefore contribute to apparent deficiencies in record keeping.

Changes in practice recommended

Elderly patients presenting with acute limb ischaemia undergoing emergency surgery are a very high risk group. It is well known that many suffer from cardiovascular insufficiency. Blood loss and other events during operation only heighten their risk of mortality and morbidity. The lack of angina or shortness of breath pre-operatively is not a sufficient guarantee against significant coronary artery disease as many patients have very limited mobility. Based on these concerns, the optimum management of such patients to reduce morbidity and mortality is that they are treated as a very high risk group both pre-operatively, intra-operatively and in the post-operative period.

These patients are best served by having experienced anaesthetists and surgeons carrying out the procedures as sufficiently and expertly as possible. This is not always possible in emergency situations. There is no doubt that such patients benefit from immediate transfer to high-dependency or intensive care units following surgery. This will enable the optimal management of adverse events and allow expert assessment of the patient immediately after surgery - one of the most vulnerable periods for the patient. In addition the transfer of a patient to either high-dependency or intensive care unit reduces the time taken for consultation and transfer if and when a serious event occurs as in this patient. However it is well recognized that these logistic considerations cannot apply to every case in all hospitals. However I believe it to be the preferred option.

Early discharge and adverse outcome looks bad

Summary:

A 66 year old man was admitted with right hip osteoarthritis for a routine right total hip replacement. Previous medical history included rheumatoid arthritis, chronic lower back pain, for which he had undergone a laminectomy and spinal fusion and previous gastric ulcer. His admission appeared unremarkable and he underwent a routine right hip replacement.

Inter-operatively there were no documented problems and standard uncemented femoral stem and acetabular components were inserted. The patient returned to the ward in good condition and began an accelerated post-operative rehabilitation protocol.

Pre-operative haemoglobin was 138, haemoglobin following surgery was 98, with a haematocrit of 0.29. It seems completely reasonable that the patient was not transfused at this level. Usual post-operative DVT prophylaxis was begun, including early mobilisation and clexane.

Post-operative days two to four were unremarkable. The patient mobilised, had decreasing pain levels and had lines and catheters removed. There were no problems with the bowels or voiding.

On day four post-operatively the wound was inspected by the team. The patient was mobilising without crutches and walked with a mild limp. He was discharged home, being taken home by a friend. The plan was to continue clexane injections until day ten and a visit by the occupational therapist was arranged.

The patient was delivered home by a neighbour, who on subsequent checking later in the evening, discovered the patient deceased. I believe the post-mortem examination revealed evidence of an acute myocardial infarction.

Comment:

I think this case does adhere to a reasonable care pathway. I feel the course of management was

completely appropriate and there is nothing to suggest in the clinical record, that this patient was discharged earlier than is advisable.

There is no evidence in the clinical record of any pre-existing ischaemic heart disease to suggest that the patient was at high risk of undergoing an acute myocardial infarction in the post-operative period.

Certainly an area of discussion is whether or not it is suitable to discharge elderly patients home within four days of what is a major orthopaedic operation. This patient was discharged home to completely care for himself, with some support provided by ancillary hospital services. I do not feel that this actually contributed to his death at all though.

Overall, I do not feel there is any aspect of the clinical management of this patient that needs addressing and feel that there is no indication the heart attack could have been prevented by a different management plan.

Cardiac failure following myocardial infarction.

Summary:

This 78 year old gentleman with a complicated past medical history was admitted for drainage of a bilateral subdural hygroma.

His past medical history confirmed a right nephrectomy for transitional cell carcinoma, paroxysmal atrial fibrillation and anxiety. He had had undergone insertion of a VP shunt for normal pressure hydrocephalus. He presented with increasing falls, poor mobility and some bladder dysfunction. A VP shunt was inserted in five months earlier and post operatively his recovery was complicated by bilateral sixth nerve palsy and consequent diplopia. He then went on to develop bilateral subdural hygromas and thereafter he had the valve with a VP shunt changed to an adjustable strata valve.

He was then sent to rehabilitation. Further follow up CT scans showed residual hygromas and readjustment of the strata valve and follow up CT scanning did not show any changes and his clinical symptoms remained. In view of the persistence of the subdural hygromas it was decided to go ahead with bilateral burrhole drainage of the subdural hygroma.

This procedure appeared to be completed uneventfully and post operative CT scanning confirmed satisfactory drainage of the hygroma. Post operatively in the HDU, he had a minor myocardial infarction plus fast AF with a positive troponin rise and the development of pulmonary oedema.

He was reviewed by the Cardiologists and subsequently reverted to sinus rhythm. The patient was stabilized and was moved to the ward the following day. He started to mobilize and was noted to be well with a GCS of 15 and no focal deficit. Four days post operatively in the early hours of the morning he was found unresponsive. The case was subsequently referred on to the Coroner for further review. These findings have confirmed that the heart was enlarged and dilated with severe arteriosclerosis in all three coronary vessels and the lungs were heavy and congested.

In the Coroner's opinion the cause of death was cardiac failure secondary to an acute myocardial infarction.

Comment:

It appears that this gentleman's clinical care has been satisfactory and the outcome would appear to be secondary to a complication in an elderly gentleman with pre-morbid cardiac compromise. The development of subdural hygromas in patients with normal hydrocephalus is a well-known complication and the placement of a strata valve to adjust the drainage pressure would appear to be entirely reasonable. The cardiac compromise following surgery was adequately treated and it would appear that his post operative medical care was satisfactory.

The record keeping was clear and concise and I would not hide any areas of concern. There are certainly adverse events in the management of this patient and I could not suggest any particular changes in practice. Patients with normal pressure hydrocephalus are by definition at high risk of post surgical complications as they are normal elderly with numerous co-morbidities.

The indications for surgical intervention were entirely reasonable and the treatment of the complications that developed could not have been improved.

Was treatment justified?

Summary:

45 year old female admitted with painful third nerve palsy secondary to a posterior communicating artery aneurysm. The aneurysm was successfully treated with endovascular coiling.

She had an unruptured 3mm middle cerebral artery aneurysm for which the patient requested treatment. There was appropriate informed consent from the patient. During the elective endovascular treatment of the aneurysm, the middle cerebral artery ruptured resulting in the death of the patient.

Comment:

The important point of this case is whether the aneurysm should be treated. Small aneurysm of 3mm has a very low risk of rupture over 5 years.

Brian stem infarction with unavoidable death.

Summary:

This gentleman in his mid 60's presented to the hospital having left work in the morning with vertigo, nausea, slurred speech and vomiting. On examination he was noted to have nystagmus on left lateral gaze. He was previously fit and well with no relevant previous medical history.

Following admission that night, the following morning he was noted to be unwell and had a left sided facial weakness and diplopia. CT at the time confirmed the presence of a left sided temporal arachnoid cyst and an area of low density in the left cerebellar region. This was suspicious for an area of cerebellar infarction. Following his initial assessment at approximately 0900 hours and a secondary review at 1100 hours his conscious level deteriorated and he required intubation for airway protection. A repeat CT scan at this time confirmed the established left side posterior cerebellar infarction with no obvious hydrocephalus.

At this stage his clinical condition was discussed with the neurosurgeons at a different hospital. It was arranged for the patient to be transferred to that hospital for further management. He was transferred to the hospital's Intensive Care Unit at 1545 on the same day.

He was sedated and ventilated. He was reviewed by the neurosurgical team at this stage and recorded in the notes that there was a left cerebellar hemisphere infarct with associated oedema with mass effect. There was no underlining haemorrhage. Neurological examinations at this stage confirmed pupils small, reactive with no movement in the right arm, some movement in the left arm and withdrawing of both lower limbs to pain. An intracranial pressure monitor was placed. He then had a CT angiogram, which confirmed gross oedema of the cerebellum, was associated with left sided posterior cerebellar infarction and a suggestion of brain stem ischaemia. It also confirmed that basilar artery occlusion.

At this stage it was requested that the stroke team review the patient and take over his care. During the course of the night, he remained intubated and ventilated. Intracranial pressures at this stage were in single figures. He remained stable over night but the following morning his left pupil dilated. There was no other change in status and a repeat CT scan was performed. This confirmed left sided cerebellar infarction in the territory of the left posterior cerebellar artery. The basal cisterns were obliterated and he had developed hydrocephalus. At this stage he was reviewed by the neurology team who felt there was no indication for anticoagulation given the extensive degree of infarction and the risk of bleeding into the established infarct. An echocardiogram was requested and it was noted that they would review the patient later. He was subsequently reviewed by the neurosurgical team to assess whether a decompressive procedure would be indicated. He was then taken to theatre for a posterior fossa decompression.

On review of the operation notes it was noted that the left side cerebellar hemisphere was very tight and oedematous and part of the cerebellum hemisphere was resected. The posterior fossa was left open and a dual patch applied. Post operatively the patient went back to the intensive care unit where he initially remained sedated and ventilated. On de-sedation he made no respiratory efforts and was noted to be brain stem areflexic. He remained in the intensive care unit for further three days and following full discussion with the family, treatment was withdrawn and the patient subsequently died.

Comment:

On a neurosurgical viewpoint this case has been handled appropriately. This patient presented with a basilar and posterior cerebellar infarct and on deterioration was transferred to another hospital. Initial assessment confirmed progression of the area on infarction and the main problem with his assessment was the timing of the neurological input. The main treatment for consideration would have been the possibility of thrombolysis. While this is relatively experimental in nature and outcomes are poor, the delay in the neurologist reviewing the patient meant it was not possible to consider this treatment possibility. The delay in review overnight was in order of ten hours and during that time the patient had obviously clinically and radiologically deteriorated. On the morning prior to surgery there was a large area of established infarction involving the cerebella hemisphere, posterior cerebellar artery territory and brainstem. It could be argued that surgery at this stage was futile but the discussion to proceed with surgery was not a matter for concern.

I think this patient probably had a poor outlook and the only major concern I would point out would be the timing and communication of the medical team. I am not sure the overall outcome would have been changed anyway.

Death as a result of a secondary traumatic intra-cerebral haemorrhage

Summary:

The patient was a 62 year old male who apparently fell from his truck, approximately one and a half metres, onto the left side of his head. He was transferred to the tertiary referral centre, from a regional hospital, some hundreds of miles away. His initial CT scan, revealed a 1.5 cm subdural haematoma, associated with a haemo-pneumothorax and rib fractures. Nevertheless, his GCS at the time of his arrival at the tertiary referral centre was 14/15. A craniotomy was performed, and his subdural haematoma was evacuated.

He made a good recovery following that procedure, but approximately ten days later had a seizure twenty four hours following the cessation of Dilantin. A CT scan performed at that time revealed evidence of a very large acute intra-cerebral haemorrhage in the left temporal lobe where, at the time of his original CT scan, he was noted to have had a small intra-cerebral haemorrhage.

He was intubated and given Mannitol. Nevertheless, his left pupil became fixed and dilated and after a family meeting a decision was made to withhold further active treatment. It would appear that his condition deteriorated a few days prior to the seizure as a result of what was almost certainly septicaemia. However, the day before his seizure he was noted to have been less confused with a GCS score of 14 and a score of 9/12 on the PTA scale.

A further CT scan was performed 3 days prior to his seizure. That study revealed evidence of the previously noted small left temporal intra-cerebral haemorrhage which was essentially unchanged.

Comment:

The seizure almost certainly occurred as a result of the secondary haemorrhage, and it seems unlikely that the withdrawal of Dilantin at that stage was of much significance. The sepsis would appear to have been generalised, rather than cerebral. Furthermore, a coagulation profile, performed immediately after the seizure, was almost normal. Finally, the decision not to treat, based upon the expected outcome, insofar as quality of life is concerned, appears to have been perfectly reasonable.

In summary, the patient developed a massive intra-cerebral haemorrhage, in the region of a previously noted small and stable intra-cerebral haemorrhage, approximately ten days post-injury. It seems unlikely that anything could have been done to prevent or ameliorate the effects of that complication, which was directly attributable to the effects of the initial head injury.

Hip fracture in an elderly patient with critical aortic stenosis likely to become a "no win" situation

Summary:

An 84 year old female, transferred from a district hospital, with intertrochanteric fracture of the left hip, following a mechanical fall. She was known to suffer from critical aortic stenosis and Congestive Cardiac Failure, secondary to ischaemic cardio-myopathy.

She was assessed by an Anaesthetic team to be fit for surgery for Dynamic Hip Screw. The procedure was carried out two days after admission. However, by the time she came to surgery, she had already gone into oliguria.

The intra-operative course was uneventful. General anaesthesia was administered, and the Orthopaedic Registrar was assisted by his consultant. In addition to the usual anaesthetic monitors, a radial arterial line was also employed. Blood pressure, heart rate and oxygen saturation remained stable throughout. Intra-operatively, Phenylephrine was administered to ensure maintenance of a stable blood pressure.

She came out of the operating room at 1912 and was found to be in anuria. Oxygen saturation in the ward was satisfactory (97%) with oxygen mask at six litre flow. She received saline as a bolus (250 ml) at 2050 and another saline bolus (250 ml) at 2115.

At 0000 fluid balance parameters were as follows:
Low blood pressure, maximum 80/60 or 100/60. Total fluid administered for the day was three and a half litres, against a low urine output (400 ml).
Urea 9.6; Cr. 143 (64 on admission, three days prior).
Heart rate: 100 beats per minute - in atrial fibrillation.
Respiratory rate: 20 per minute.

Oxygen saturation dropped to 94% with two litre nasal prong flow of oxygen. JVP was not raised. Decision made that she was not in fluid overload as the mucous membranes were dry and the patient was thirsty. There were coarse creps in the lungs. The diagnosis was pre-renal failure with concurrent CCF and not overloaded.

The Medical Registrar was consulted and administered half a litre of Gelofusine (at 100 ml per hour) followed by four percent albumin (at 80 ml per hour) for three hours. At 0300, patient was still thirsty, Gelofusine (at 200 ml per hour) was administered until it was finished. Albumin was also administered (at 150 ml per hour). The next day, further trial fluid loadings were continued with normal saline bolus (250 ml) at 1200 . Subsequently at 1330 the patient was given normal saline (250 ml) plus 40 mg intravenous lasix.

The patient became unstable with pulse 113, respiration 26 - 32, blood pressure of 80/50. At 2150, the patient was deemed to be critical. At 0200, she passed away.

The cause of death was listed as acute renal failure with pulmonary overload. Antecedent causes were listed as CCF due to Ischaemic Cardiomyopathy, due to critical aortic stenosis. A significant condition listed was atrial fibrillation.

Comment:

I do not have any areas of concern regarding this case. However, I would like to touch on two areas for consideration.

This patient was assessed by a Cardiothoracic Surgeon for consideration for Aortic Valve Replacement (AVR), nine days prior to her fall. At that stage she was in moderate peripheral and pulmonary oedema and assessed her chances of not surviving the surgery to be, at least, fifty percent. Doppler echo-cardiography, preceding this consultation, showed a small pericardial effusion, pleural effusion, severe aortic stenosis with trivial regurgitation, mild to moderate mitral regurgitation; mild tricuspid and pulmonary regurgitation, moderate impairment of ventricular function and dilated atria. An X-ray Chest done at the same time, confirmed interstitial pulmonary oedema.

The patient's prognosis was put at less than fifty percent for surviving AVR surgery. Given that AVR would have removed the threat to her life. I believe her chances of surviving a fracture of the hip (and fracture surgery) to be substantially less than the survival rate estimated for the valve replacement.

I believe that the decision to operate was the wrong decision - immediately pre-operatively, she was already in oliguria and CCF. In general terms, surgery should not be undertaken in a high risk case, like this one, without extensive invasive monitoring and ICU care. Without these facilities, critical fluid balance, necessary to maintain an adequate cardiac output for organ perfusion, in a failing heart with aortic stenosis, is simply not possible. Blindly infusing bolus after bolus of colloids and crystalloids is unacceptable.

Having arrived at these conclusions, I am obliged to admit (in the same breath) that this patient's chance of survival was poor. If her cardiac reserve was inadequate to compensate for the slight haemodynamic shifts involved here, she was probably doomed, even with the most sophisticated technology at her disposal.

Critical Aortic stenosis is inevitably fatal, if not rectified. Once complicated by organ failure, death is imminent. Cardiac de-compensation, combined with renal shut-down, is a "no win" situation.

It is my belief that a reasonable pathway of care was followed, throughout, in the management of this patient Records were excellently kept in legible writing.

Death from aspiration pneumonia secondary to anastomotic leak was potentially avoidable

Summary:

A 59-year-old lady was admitted for an elective total pancreatectomy with a diagnosis of branch type intra-papillary mucinous neoplasia of the pancreas.

The patient had presented to a District Hospital six months earlier with chest pain. A CT scan of her chest and abdomen had been performed which demonstrated a cystic lesion in the tail of the pancreas and a cystic uncinate mass. These were further investigated by endoscopic ultrasound. The tail cyst contained a mucinous material; the head cyst revealed pink fluid only. Subsequently when the patient was reviewed by the Surgeon five months later he was under the impression that mucoid fluid had been aspirated from both cysts. A diagnosis of intra-papillary mucinous neoplasia was entertained and a decision to perform total pancreatectomy was arrived at after extensive discussion with the patient and her relatives.

The initial operation was technically uneventful however five days post-operatively the patient had an episode of profuse faecal vomiting and cardio-respiratory arrest requiring resuscitation intubation and adrenalin and atropine and defibrillation in order to procure sinus tachycardia. Following resuscitation the patient had a second look laparotomy, which revealed a diffuse biliary peritonitis secondary to a leak from the pancreatic duct. The patient had drainage lavage and abdominal closure. Despite maximum supportive care over the following seven days the patient remained unresponsive to stimuli with sluggish pupillary reflexes and CT scan of the brain showed cerebral oedema with gyral and sulcal effacement and poor white grey differentiation. After discussing it with the family it was decided to withdraw treatment and the next day the patient was certified dead.

A post-mortem was not performed.

Pathology of the resected pancreas was subsequently reported as "showing multi-focal intra-papillary mucinous neoplasia without malignant change".

Comment:

In the reviewer's opinion the probable cause of death was asphyxia secondary to gastric dilatation and uncontrolled vomiting with aspiration pneumonia and anoxic cardiac arrest. The dilatation was probably due to biliary peritonitis from a leaking pancreatic duct.

In retrospect there are some areas for concern in relation to this patient's management. The diagnosis of intra-ductal papillary mucinous neoplasia with diffuse field change requiring total pancreactomy was based on the presence of two cystic lesions in the pancreas one of which did not yield mucinous fluid. Given the low-grade nature of the condition on CT scanning, endoscopic sonography and the age of the patient repeated re-assessment with MRI may have been the safer option. Post-operatively patient was seen because of vomiting on two consecutive days. On-call staff noted on the first occasion that the vomitus looked like partially digested jejunostomy feed and on the second occasion that it looked like the fluid that was coming out of the gastrostomy drain and at that stage was more than a litre in volume.

This led the reviewing Doctor to query the possibility of an anastomotic leak and he discussed this with the surgical team who he felt would undertake imaging to reassess the situation. Subsequently the patient was reassessed and deemed to be stable and imaging was not performed.

It is the reviewer's opinion that the repeat abdominal ultrasound would have diagnosed the gross ascites and probably the gastric dilatation which should have prompted an earlier re-laparotomy prior to the catastrophic vomiting and aspiration.