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National Case Note Review Booklet

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Chair's report

This edition of the National Case Note Review Booklet highlights again the recurring theme that many patients have less than optimal management and care.

Delay in decision-making often leads to very poor outcomes. It is essential that we all try to make decisions and swiftly act on them. Surgery is an art and there is always a balance between intervening and observing; however, when decisions have been made and action needs to be taken, this must occur promptly. There may be many reasons why our hospital system does not always deliver rapid treatment: surgeons being unwilling to advocate for the benefit of their patients should not be one of them. The cases in this booklet certainly highlight inexplicable delays in treatment that, with the benefit of foresight and hindsight, should not have occurred.

The other concern that comes through very clearly is the lack of consultant involvement. Our public hospital system may have a range of consultants tasked with looking after the wellbeing of patients on the ward and in the emergency department; however, senior leadership and guidance is essential. These cases seem to have lost the leadership required in orchestrating appropriate treatment in a timely and effective fashion.

Medical records also appear to have been inadequate and this raises serious concerns about whether clear guidance is being provided from the most senior members of the surgical team.

Despite some of the cases demonstrating delay and lack of consultant involvement, the outcome for the patient may have remained the same regardless. However, the objective of high-quality surgical care is to ensure that it is provided in a timely and efficient fashion and that the leadership is provided from the most experienced and knowledgeable members of the surgical team.

Delivery of care in this fashion acts as a role model to more junior surgeons and staff who hopefully will then continue the standard as they inevitably become the senior team members. There is no doubt that we can all learn from the experiences encapsulated in this booklet and I strongly urge that the lessons learned from delay and senior involvement be extended to units around the country to ensure maintenance of the highest quality surgical care.

Any constructive feedback that can be provided based on these reports will always be gratefully received.



Guy Maddern

Chair, ANZASM

Case 1: Airway obstruction – delay to diagnosis and airway control

Otolaryngology head and neck

CASE SUMMARY

A man in his late-50s was transferred to a tertiary centre with impending airway obstruction. A benign fine needle aspirate had clouded the clinical picture of a rapidly enlarging mass. Despite signs of significant airway obstruction, the patient was not seen by an ENT (ear, nose and throat) surgeon for 3 days following admission, after which the airway was examined and a fixed vocal cord observed. Definitive airway securing was not performed until a week after admission, despite the patient needing adrenaline nebulisation and intravenous (IV) dexamethasone. Delayed reading of a chest X-ray indicated possible metastatic disease.

One week following admission, with impending airway compromise, an urgent fibreoptic intubation, tracheostomy and attempted thyroidectomy was performed. Following the operation, the patient was unable to be weaned from the ventilator. Pathology showed a malignant spindle cell tumour of the thyroid. A computed tomography (CT) scan of the chest revealed multiple metastatic deposits with evidence of pleural effusions. Treatment shifted to palliative care, and the patient eventually passed away from respiratory failure.

DISCUSSION

Despite the final diagnosis likely to be a form of anaplastic thyroid cancer for which the outcome may not have changed, there were clear issues in the management of this patient. Areas for consideration include:

- A delay of 7 days for a definitive diagnosis and airway control for a patient with impending airway obstruction.
- Provision of a definitive pathology report to clarify treatment. For an aggressive thyroid cancer, aggressive surgery and possibly radioactive iodine may have improved the situation. For an anaplastic carcinoma, no intervention would have helped.
- Delay in securing the airway may have exacerbated the postoperative respiratory failure, presumably caused by the metastatic disease and pleural effusion. Again, if it was anaplastic carcinoma, no intervention would have helped.

CLINICAL LESSONS

Delay in management and diagnosis compromised treatment for this patient with an advanced thyroid malignancy.

Case 2: Questionable decision to undertake major surgery on a patient who was clearly palliative. Was an operation necessary?

General Surgery

CASE SUMMARY

A man in his late-40s presented to hospital with a perforated viscus. He was known to have inoperable renal cell carcinoma and had been managed with palliative chemotherapy for 2 years prior to the current presentation. He was taken to theatre by a urological surgeon and a general surgeon, who performed a Hartmann's procedure, partial gastrectomy, splenectomy and nephrectomy.

The patient was reviewed the following month in the oncology outpatient clinic and appeared to be struggling following the complications of the surgeries, including the excision of a large malignant tumour, and associated bowel movement. The patient developed intra-abdominal sepsis and required further laparotomies over the course of the next couple of months, after which he was readmitted for left subphrenic collection and percutaneous drainage. He was referred to palliative care 2 weeks after readmission and died shortly afterwards, 3 months after the initial surgery.

DISCUSSION

Notwithstanding the patient's age, the decision to operate rather than palliate in this circumstance—albeit a very difficult one—is possibly an error. The outcome was predictable and the patient required a further series of procedures.

The brief history provided by the original surgeon gives none of the background discussion that would have clearly occurred between the surgeon, the patient and the family before the emergency operation was undertaken. Conversations about the preferences of the patient and his relatives regarding the probable outcome of any surgical intervention are not revealed. Brief additional comments give some indication that because of the patient's relatively young age, the surgeons felt they were 'obliged to attempt surgical intervention'.

The question must be asked: If he was inoperable 2 years ago, how could an emergency presentation make it any more likely that he was operable now? If he had been 65 years of age would that have altered the decision to operate? Looking at it objectively, this was clearly a terminal event and the patient should have been palliated. He and his family had been informed that his condition was not curable,

as there is a letter from the oncologist to this effect. There is no evidence that he was referred to palliative care services although it does appear he was referred to the oncology social worker.

Although the operation notes were not provided, the extent of the surgery was enormous. Empathy is extended for the way both surgeons must have been feeling throughout the procedure. Again, there is a lack of information as to the reasoning behind their actions. Did they consider baling out at any stage? Why did they choose to remove the kidney? Was the spleen injured as part of the mobilisation of the left colon? Was the partial gastrectomy done because they injured it removing the spleen?

CLINICAL LESSONS

That this patient survived only to live the remainder of his days in and out of hospital with ongoing sepsis is a sad testimony to fact that this operation was ultimately done in vain. It served no purpose except to assuage the feelings of hopelessness that we all feel when confronted with a young patient whose time is up. It is not our job to save everyone at all costs, but to help our patients make the best of the situation that confronts them.

Case 3: Velopharyngeal dysfunction following multidisciplinary head and neck surgery

Plastic Surgery/ENT

CASE SUMMARY

A male in his early-90s in very good health for his age, was admitted to hospital with an invasive tumour involving his right alveolus, maxillary sinus, nasal floor and nasolabial skin. The patient had been a heavy smoker many years before. The tumour was 3cm in diameter with indistinct margins and alveolar ulceration.

Assessment in the head and neck multidisciplinary clinic determined 2 possible options: treatment with wide local excision and microvascular reconstruction followed by adjuvant radiotherapy, or palliative radiotherapy.

A positron emission tomography (PET) scan demonstrated probable bilateral cervical lymph node metastases, so a bilateral supraomohyoid neck dissection was added to the treatment plan. This was considered to be the only curative treatment option. Surgery was performed by a team of surgeons from Plastic and Reconstructive and ENT. The operation took 14 hours and involved the recommended excision and neck dissection. Reconstruction was achieved with a composite myocutaneous fibula flap from the right leg, with the donor site grafted. The flap had no subsequent intrinsic problems. The pathology report indicated a large (≥ 3 cm) poorly differentiated squamous cell carcinoma invading bone and skin and extending to at least 4 margins. Review at the clinic recommended adjuvant radiotherapy to the right maxilla, after dental clearance. (This treatment never eventuated.)

Following an initial period of confusion and disorientation, the patient recovered remarkably well, other than 2 major problems related to velopharyngeal dysfunction, these being: repeated aspiration of sputum, oral secretions and gastric regurgitation resulting in aspiration pneumonia and eventually bronchiectasis; and severe oesophageal dysphagia with inability to initiate a swallow.

Despite focused attention from all allied services, the patient experienced continued aspiration and dysphagia. Video-fluoroscopy showed a dysfunctional velopharynx and no ability to swallow or expectorate. Eventually a percutaneous endoscopic gastrostomy (PEG) was inserted for feeding purposes, but metabolic equilibrium was difficult to achieve, complicated by the onset of type 2 diabetes. Repeated metabolic problems and aspiration occurred despite the frequent efforts of attending staff.

The patient survived for 6 weeks following surgery; however, velopharyngeal function did not improve. A safe swallow and good cough did not develop; this inability to cough up sputum or expectorate continued until his death. Repeated episodes of aspiration eventually led to the reluctant decision to palliate, and a rapid terminal course ensued.

DISCUSSION

Two primary adverse events occurred during the management of this patient:

- oesophageal dysphagia resulting in nil by mouth
- repeated aspiration resulting from velopharyngeal laryngeal dysfunction

It is impossible to determine why velopharyngeal function was so deranged in this patient and why no recovery occurred over 6 weeks. The tumour excision was quite anterior in the oral cavity and did not involve the pharynx. It is possible that damage to the ansa cervicalis nerve(s) during the neck dissection could have caused a reduction in laryngeal elevation during swallow. The age of the patient may also have been a factor preventing pharyngeal rehabilitation with only a relatively minor neural defect. Without any operative notes it is difficult to determine the extent of the excision and assess any problems that may have occurred during surgery. There should have been no impact on the vagus or glossopharyngeal nerves and return of velopharyngeal function should have occurred much earlier.

CLINICAL LESSONS

For this patient without a safe swallow, a PEG could have been inserted earlier to try and stabilise nutrition and metabolic state.

An early postoperative tracheostomy may have protected the lungs until protective reflexes returned.

Case 4: High-risk patient with adhesive small bowel obstruction

General Surgery

CASE SUMMARY

A man in his mid-70s was transferred from a small regional hospital with a presumed diagnosis of small bowel obstruction (SBO). He had a background of diabetes complicated by ischaemic heart disease (coronary artery bypass graft [CABG]), peripheral vascular disease and chronic renal impairment, and a previous peptic ulcer bleed. He had been diagnosed with colon cancer 17 years previously, for which he had undergone a total colectomy with an ileorectal anastomosis.

The patient presented with acute onset of severe general abdominal pain and absolute constipation. A non-contrast CT scan was requested. He was seen by the general surgery registrar and intern at 15:30, approximately 4–5 hours after transfer. He exhibited signs of peritonitis with a distended tender abdomen. He was haemodynamically stable; white cell count $7.2 \times 10^9/L$ and C-reactive protein (CRP) 24mg/L. Plans were made for nonoperative treatment with nasogastric tube drainage, IV fluid rehydration and insulin-dextrose infusion.

A medical emergency team (MET) call for hypotension (systolic blood pressure [BP] 85 mm Hg) was made in the evening (21:30). IV fluids were given, and the surgical registrar informed. The surgical registrar reviewed the earlier CT films, which confirmed SBO and a transition point to the right of the midline, likely secondary to adhesions. The patient was admitted to the high dependency unit (HDU) for observation. He was reviewed by the consultant surgeon at about 01:00, with plans for laparotomy in the morning 'if not settling'.

The patient continued to be unstable overnight, with persistent hypotensive episodes requiring inotropic support. Upon review during the morning ward round, the patient was noted to be febrile, tender, in mild respiratory distress and on 25ml/hr noradrenaline infusion. The intensive care unit (ICU) team felt that the patient was in shock, with likely contributions from sepsis, and cardiogenic and distributive sources. The team recommended urgent surgery at 08:45.

Before the patient could be taken to theatre, he went into pulseless electrical activity arrest at 10:00, requiring 2 minutes of cardiopulmonary resuscitation, intubation and 1mg adrenaline. Lactate was 7.1mmol/L. Resuscitation was successful in restoring rhythm and pulse. At laparotomy, 30cm of ischaemic small intestine was resected. The previous ileorectal anastomosis was taken down and

an end-ileostomy brought out. The patient continued to decline rapidly over the following 24 hours and passed away.

DISCUSSION

A delay in the decision to operate contributed significantly to the death of this patient. From the notes, the timeline documents a clear deterioration in the hours after admission to hospital. The non-contrast CT scan should have been reviewed earlier, which would have highlighted the futility of nonoperative treatment. It is impossible to understand why surgery did not take place after the patient was reviewed by the consultant surgeon at 01:00.

CLINICAL LESSONS

In these situations of mechanical SBO, the preferred approach is to be extra-aggressive with patients with high-risk medical issues: it is better to operate on a stable patient rather than an unstable one. Otherwise, if the significance of the medical issues precludes surgery and the patient and family agree, it should be made very clear from the beginning that surgery will not take place at all.

Case 5: Death from aspiration pneumonia precipitated by oral bowel preparation

General Surgery

CASE SUMMARY

A woman in her late-70s was admitted to hospital for recurrent SBO on a background of metastatic cancer. She had multiple comorbidities including ischaemic heart disease, congestive cardiac failure, chronic obstructive pulmonary disease and peripheral vascular disease. She had previously been diagnosed with 4 cancers, the predominant one being a gallbladder cancer resected the previous year. She had also undergone a right hemicolectomy for stage 1 caecal cancer and a gastrectomy for a duodenal neuroendocrine tumour. She was considered ASA IV (American Society of Anesthesiologists Physical Status). Goals of patient care were clearly documented: these had become increasingly conservative (not for resuscitation) on successive admissions over 6 months.

The patient had been admitted 6 times for similar problems over the preceding 3 months, mostly under different consultants. She had been managed conservatively each time. She was readmitted to hospital with a presumed further sub-acute SBO the day after previous discharge and was correctly managed conservatively.

While no radiological reports were provided in the file, reference was made to an abdominal X-ray, which showed dilated small bowel loops and that contrast from the previous Gastrografin™ follow-through had made it into the colon. There was reference to a PET scan 3 months earlier suggesting nodal metastases and possible peritoneal metastases.

During the first few days of her admission there was some clinical improvement and she progressed to nourishing fluids. The consultant decided to perform an inpatient colonoscopy, although, interestingly, the day before this, the intern noted on the ward round 'the patient was not for colonoscopy until the blockage cleared.'

The patient received appropriate bowel preparation, being 2L of ColonLYTELY™. Overnight in ICU; however, she developed aspiration pneumonia with typical clinical findings: right lung consolidation, positive blood cultures and inotropes requirement. She made some improvement over the next few days but remained on inotropes and suddenly passed away.

DISCUSSION

The key issue in this case is the appropriateness of the colonoscopy. The consultant noted that this decision had been made after consultation with the patient's previous surgeon, who had performed her resection; the rationale being to exclude any problem amenable to intervention at the anastomosis. Presumably, she had not had a postoperative colonoscopy and, given her frailty and comorbidities, it was considered best to do this as an inpatient procedure.

One questions the requirement for a colonoscopy in this case. It could be worthwhile if there was a clearly dilated small bowel down to the point of the anastomosis on CT. No radiology reports were available in the patient's file. It appears a repeat CT scan was not performed during this admission but one probably had been done recently. Contrast from the previous Gastrografin™ follow-through study had made it into the colon on abdominal X-ray, making significant obstruction at the anastomosis unlikely.

The colonoscopy should only have been considered if there was clear evidence of obstruction at the anastomosis level, with a view to endoscopic treatment (e.g. dilation or stent), given that a laparotomy did not appear a valid option for this patient (due to frailty and comorbidities).

If the colonoscopy was deemed essential, the appropriateness of oral bowel preparation would be the next question. The patient's SBO was not an acute event. Despite some symptomatic improvement upon admission, in retrospect, it was clear there was ongoing obstruction, which became obvious once she was given oral bowel preparation.

The colonoscopy could have been performed without oral bowel preparation, such as enema preparation only. While views of the colon would likely be inadequate, the only real interest in the colonoscopy was at the anastomosis, which in this situation should be adequately visualised after lavage through the scope.

On a separate issue, with multiple closely recurring admissions for SBO, it appears that the decision had been made not to offer laparotomy, which appears correct in this context. Assuming laparotomy was inappropriate, it may have been better to involve the geriatric and/or palliative care physicians rather than just the surgical team.

CLINICAL LESSONS

Colonoscopy in the circumstances of this case was high-risk and low-yield.

Aspiration pneumonia is a common problem in the elderly, comorbid patient group. These patients often do not report the usual symptoms leading up to the aspiration event, which is often unexpected.

Case 6: Failure to develop and execute a clear plan that minimised risk and maximised benefit

Vascular Surgery

CASE SUMMARY

A woman in her mid-60s was a medical admission to a large metropolitan hospital following an unwitnessed fall. She was transferred to the care of the vascular unit for left third toe osteomyelitis and a right chronic foot ulcer. Her comorbidities included severe ischaemic cardiomyopathy (ejection fraction 15%), stage IV chronic kidney disease (estimated glomerular filtration rate 2ml/min; not yet on dialysis) and diabetes mellitus.

She was reviewed by multiple medical teams prior to surgery. The renal team discussed the need for dialysis in the future, although the patient was reticent. On the sixth day of admission, she was taken for a bilateral angiogram and amputation of the third left toe. A right femoral 'up and over' puncture was employed and left superficial femoral artery recanalisation and stent insertion also took place. Significant concerns were noted in the post-anaesthesia care unit (PACU) resulting in review by the proceduralist. A CT of the abdomen confirmed bleeding from the right femoral/iliac artery. This was managed conservatively.

During the night and following day, 3 codes were called for clinical deterioration (hypotension and pain in the right groin), in addition to several reviews by the vascular unit. Several units of blood were transfused. Eventually the patient was taken to the angiography suite where several stents were required to cover an actively bleeding iliac artery from the left groin. Although this was successful, the combination of 3 doses of contrast (2 for angiography and 1 for a CT of the abdomen) associated with prolonged hypotension, precipitated further deterioration. The renal unit was initially willing to offer dialysis, but after a permacath insertion was cancelled due to persistent hypotension, the family, patient and medical team agreed that the situation had become futile. She died soon afterwards.

DISCUSSION

There were numerous problems with the completion of the surgical review for this case. Only the initial operation was recorded and the details are inaccurate (1 hour at 08:00 submitted but case notes indicate it was actually 2.5 hours at 16:00). Obesity is recorded as a comorbidity, yet the anaesthesia record indicates body mass index (BMI) of 25. ICU/HDU care was recorded as not required despite the clear inability of the ward to care for this complex patient.

The submitting surgeon reflects that, in retrospect, nothing would have been done differently, when in fact there are multiple relatively easy changes to care that may have made a significant difference to the outcome for this patient. In the era of an electronic record available from every computer, the poor quality of this surgical case form (SCF) reflects a lack of regard for the audit process.

Regarding the management of the case, there were several areas of concern:

- An apparent failure to develop and execute a clear plan for patient care that minimised risk and maximised benefit.
- A retroperitoneal bleed was diagnosed and not acted upon.
- Very late completion of an acute resuscitation plan (ARP) seems to reflect a failure to appreciate the risks in this situation.

Retrospective record review is tricky even in the electronic era, but it seems likely that this patient was not reviewed by a consultant prior to her first operation and not until her second procedure. There is simply no substitute for the senior decision-maker being present at the point of care. Many of the critical care points reflect a corresponding lack of maturity:

- A bilateral angiogram was undertaken (increasing the contrast dose) rather than focusing on the problem requiring treatment.
- A high puncture occurred.
- A closure device was not used in the initial operation but was in the second operation.
- The proceduralist, on reviewing the patient in PACU, did not appreciate high puncture as a risk.
- A CT of the abdomen (requiring more contrast) was ordered for a condition that was likely self-evident.
- Once diagnosed, it was assumed that the retroperitoneal bleed would settle with conservative management.
- It took 3 codes and multiple reviews for realisation to dawn that conservative care was unlikely to solve the problem.

A consultant was finally present during the second successful operation, but this was too late to ensure a successful outcome. It requires maturity and experience to avoid these traps and then to solve ensuing problems should they occur.

This case should be the subject of a mortality review.

CLINICAL LESSONS

The ARP discussed with the family on the day prior to her death suggests that the team had not appreciated this patient's serious condition. The ARP is ultimately signed by a consultant; in this case, one wonders if that had happened at the outset, there might have been a different outcome.

ANZASM CLINICAL DIRECTOR'S COMMENT

This patient's care should have been driven by a consultant from the beginning. It is clear that it was all futile from the outset.

A bilateral angiogram was probably performed because the patient had tissue loss in both feet; however, in the presence of severe comorbidities, consideration should be given to minimising procedures and/or limiting them to the side that has the most pressing need for revascularisation.

Haemostasis of the puncture site without a closure device is an acceptable practice; however, the pressure must be applied correctly and for an adequate period of time. In this case with a high puncture it was likely that pressure would have been ineffective and the closure device would fail.

A CT scan for retroperitoneal bleed is an acceptable part of investigation; however, the findings must be managed appropriately. Retroperitoneal bleed from an arterial puncture should not be treated conservatively because it cannot be easily monitored.

Case 7: Complex diverticulitis in a morbidly obese patient

General Surgery

CASE SUMMARY

A woman in her late-50s with morbid obesity (BMI 54) was admitted to hospital A displaying hypotension and low oxygen saturation. She had an Adult Deterioration System (ADDS) score of 3, elevated CRP of 217mg/L and reduced albumin (22g/L). She was known to have a colovaginal fistula, revealed via CT scan one month previously. The patient was diagnosed with diverticulitis, which was initially managed conservatively with antibiotics. Two days after admission she was observed to be dry retching, although taking sips of clear fluid. She was prescribed lactulose and Movicol® during the afternoon ward round.

The following day, the patient had deteriorated. A CT scan showed a large bowel obstruction with a competent ileocaecal valve and dilated caecum; albumin had dropped to 19g/L. On day 4 of admission she underwent a Hartmann's procedure (surgeon 1), with the caecum observed to be grossly distended. The bowel was decompressed via colostomies of the caecum and transverse colon. Some spillage of bowel content that occurred during the procedure was washed out. Postoperatively the stoma was dusky but viable; however, the patient did not improve (heart rate 110 bpm, BP 99/60 mm Hg, respiratory rate 18 bpm, oxygen saturation 96%, ADDS 5). Review by the acute pain service the following day noted the patient's lack of improvement, with the anaesthetic registrar referring her to the surgical intern for review.

On day 6 of admission there was a MET call for hypotension (heart rate 112 bpm, BP 89/65 mm Hg, oxygen saturation 90%, respiratory rate 28 bpm). The patient was sweaty with a tender abdomen. Primary diagnosis by the MET team was dehydration. The surgical principal house officer requested a CT scan to look for collections, as indications suggested that the patient was entering septic shock, with BP unresponsive to intervention, raised lactate and decreasing albumin. The management plan remained conservative with a non-contrast CT scan requested. At ICU ward round the following afternoon it was noted that her sepsis was not improving, but no mention was made of a possible re-look laparotomy. Another CT scan was requested. By 20:00 she had begun to deteriorate further; by midnight she was intubated and on a ventilator.

On day 8 of admission, the family was counselled that the patient may not survive. She was returned to theatre (surgeon 2) where pus in 4 quadrants was washed out and 4 drains were placed. Her condition improved following the operation, although pus continued to leak from the left lower quadrant drain. By day 10 of

admission, faecal ooze was noted from the drains and from the midline wound. The patient had developed hypothermia, coagulopathy and malnutrition and was going into multiple organ failure. She was returned to theatre (surgeon 3) where gross faecal contamination was observed. A 2.5cm-hole was identified in the descending colon—possibly iatrogenic—and was repaired via primary closure. The abdomen was left open.

On day 12, faecal matter was observed from a drain, prompting the third re-look laparotomy (surgeon 4), which found faecal peritonitis and a large defect in the colon, attributed to pressure necrosis as the colon passed through the sheath. On day 14, a washout was performed (surgeon 1). On day 17, a fourth re-look laparotomy took place (surgeon 5) and a vacuum-assisted closure dressing was applied, which seemed to address the leaks. ICU notes report: ‘ongoing septic shock in the context of suboptimal source control.’ Falling haemoglobin levels were also noted.

On day 20, a fifth re-look laparotomy (surgeon 5) found a perforated small bowel and a leaking caecostomy, which was oversewn and a tracheostomy created. The ileum was resected but not anastomosed. Histopathology showed large areas of mural necrosis of the small bowel containing numerous fungal elements. On day 21, a sixth re-look laparotomy (surgeon 6) anastomosed the small bowel to the caecum. On day 24, the patient was again returned to theatre (surgeon 1) because a new Biodesign mesh had been placed incorrectly and required adjustment.

After 26 days at hospital A, the patient was transferred to hospital B. Upon admission, faecal leakage was noted from the abdominal cavity. A laparotomy that day indicated that the recent ileocolic anastomosis was leaking. This was resected and each end stapled off. An ileostomy was created 4 days later (30 days following initial admission at hospital A).

Despite numerous returns to theatre and 2 months of ICU treatment, the patient eventually died 74 days following initial admission at hospital A.

DISCUSSION

There were several issues in the management of this case.

Six different surgeons were listed as the primary surgeon at hospital A. Those who saw the patient on ward rounds did not always correspond to the surgeon who operated, and when she deteriorated it does not appear that her condition was always escalated to her surgeon. It was inappropriate, on day 5 of admission, for the anaesthetic registrar to ask the intern to advise the team of a problem: direct escalation to someone more senior was required. An ICU review should have occurred earlier.

Prior to the first operation the CT findings made this patient a surgical emergency.

The competent ileocaecal valve meant that the colon would continue to dilate and become progressively ischaemic, and the huge fragile bowel made late surgery technically difficult, particularly given her BMI. Laparotomy should ideally have been done urgently but, given the late hour and her serious comorbidities, first case in the morning may have been reasonable.

No information was available as to what was happening to this patient in the month prior to her admission at hospital A, that is, whether or not treatment of the colovaginal fistula was delayed. The blood results show her albumin was only 22g/L on admission, suggesting something was terribly wrong in the month before presentation. Such a fistula with an albumin of only 22g/L (presumably sepsis), made her an urgent case for investigations and treatment in the weeks prior to this admission. It was unrealistic to expect colonic repairs or anastomoses to heal in this patient.

CT scans caused operative delays. CT scans in the postoperative period are notoriously unreliable, yet there was an over-reliance on these when the patient developed signs of sepsis and clearly required a re-look laparotomy regardless of the CT scan.

By day 10 of admission, the patient was already clearly dying, and the operation that day was probably the last chance to save her. The hole in the colon was unlikely to heal primarily by suturing; there were 2 reasonable options: resect the descending colon and create a new stoma, or alternatively perform a 'damage control laparotomy' resection of the colon and simple stapling off of the end. When it was resected 2 days later, the histology showed that both the new perforation and the sutured hole had full thickness necrosis and there were multiple other areas of mucosal necrosis. It is likely that there was never any iatrogenic injury, and this all represented bowel ischaemia related to the patient's hypotension, noradrenaline infusion and poor perfusion of the splanchnic circulation.

The anastomosis on day 21 had little chance of healing. By this stage, the small bowel would likely have been very stuck down and the mesentery contracted, making it difficult to create an ileostomy, which would have been the preferred management. This was done at hospital B a few days later. The transfer to hospital B occurred too late.

Finally, decompression at the first operation could have been achieved via the cut end of the descending colon, as opposed to the caecostomy and transverse colostomy. Unfortunately, the caecostomy leaked.

CLINICAL LESSONS

Ideally, for a complex case such as this, 2 of the most senior surgeons should have taken close charge of the patient, particularly given that her predicted mortality was always very high.

Case 8: Deep vein thrombosis and fatal pulmonary embolism 23 days after internal fixation of lumbar fracture

Orthopaedic Surgery (spinal)

CASE SUMMARY

A man in his early-40s was involved in a 90 km/hr truck collision with a tree. He was transferred to a tertiary hospital via helicopter, arriving at 13:58, approximately 5 hours after the accident—including 1.5 hours trapped inside the truck before extrication. A CT scan in the emergency department diagnosed an L1 spinal fracture involving all 3 columns. This was associated with altered sensation in the left foot and leg. The patient was kept lying flat in bed on spinal precautions.

A magnetic resonance imaging (MRI) scan the following day confirmed the need for surgical intervention and clearing of the cervical spine. The MRI also demonstrated lumbosacral subarachnoid haemorrhage and possibly a component of subdural haematoma. The patient had comorbidities of obesity (BMI 37) and was an ex-smoker. Venous thromboembolism (VTE) prophylaxis was addressed by the use of an intermittent pneumatic device. It is assumed that chemoprophylaxis was contraindicated due to the subarachnoid and spinal haematomas, but this was not documented.

On day 2 of admission the patient underwent posterior instrumented fusion of T12–L2. The anaesthetic record shows the procedure commenced at 09:30 and concluded at 12:30. Postoperative instructions were to sit to 60 degrees until a Jewett brace was fitted. This occurred the following day and the patient sat on the end of the bed with the physiotherapist, after which he was nauseous and returned to bed. On day 4 of admission, the patient rested in bed while nursing and physiotherapy staff awaited an erect X-ray prior to mobilisation. Clearance to mobilise occurred the following morning and the patient was mobilised by the physiotherapist at 12:45.

The patient continued his recovery and was documented to have been mobilising with assistance. With further pain and mobility improvement, he was discharged on day 8 of admission. On postoperative day 23 (25 days after the accident), the patient died of ‘pulmonary thromboembolism’ with ‘deep vein thrombosis in the legs’ according to the coroner’s report.

DISCUSSION

Mechanical prophylaxis, in the form of thromboembolic deterrent stockings and calf pumps, were documented as used throughout this patient's admission. This was optimal care. Chemoprophylaxis was contraindicated in this patient and rightly not prescribed.

The incidence of VTE/PE (pulmonary embolism) in spinal surgery patients is generally low, with a slightly increased rate in those sustaining cord injury or fracture. At present there are no guidelines or recommendations from the Spine Society of Australia. The North American Spine Society recommends a risk/benefit analysis, given the low rate of VTE and the hazardous risk of epidural haematoma.⁽¹⁾ Recent literature reviews and metaanalyses show varying rates of reduction of VTE, whilst demonstrating at least equally increased bleeding complications.^(2,3) Early ambulation has been reported to reduce the rate of hospital complications, reduce length of stay and likely reduce VTE/PE.^(2,3)

This patient was immobile in bed for 5 days. An approximate 48-hour delay in mobilisation occurred awaiting the fitting of a brace and X-ray clearance. Enhanced recovery after surgery protocols are expanding in spinal surgery with favourable outcomes. These include day of surgery mobilisation. Reviewing the timeline of this patient's admission shows areas where efficiency could be improved on a system-wide level. Case review has identified the following areas for further allocation of hospital resources:

- Reduced timing to MRI to expedite surgical planning.
- Ready access to theatre time in hours. The considerable physiologic insult of spinal surgery upon a patient already potentially suffering from a systemic inflammatory response makes after-hours operating undesirable and, at worst, potentially dangerous. Recognition of the need for these facilities should be addressed at a hospital level.
- The true utility of interventions/investigations such as the fitting of a brace and X-ray clearance may need reviewing at a departmental level once the delay in mobilisation has been recognised. Unrestricted mobilisation in hospital following surgery could be trialled, with Jewett brace fitting and X-ray performed when convenient without delaying mobilisation. The failure of spinal constructs is typically with cyclic loading, and a short period of unrestricted mobility is unlikely to cause catastrophic failure.

CLINICAL LESSONS

Ideally, this patient would have had his MRI the afternoon/evening of admission and surgery would have subsequently occurred the following day. Unrestricted mobilisation should have commenced the evening of surgery.

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Case 9: Intraoperative bleeding – who was in charge?

Urology

CASE SUMMARY

A man in his late-80s was admitted electively to a private hospital for a 'palliative' open right radical nephrectomy for an upper tract tumour. Significant comorbidities included ischaemic heart disease (prior CABG surgery in 2003), aortic endocarditis (on long-term antibiotics), hypertension, hyperlipidaemia, a transient ischaemic attack (TIA) resulting in a left carotid endarterectomy in 2016, chronic renal impairment, impaired glucose tolerance and osteopenia. He had previously undergone a radical cystoprostatectomy and ileal loop urinary diversion in 2005. He was assessed as ASA 3.

The operation was apparently uneventful. However, the patient was haemodynamically unstable on arrival in recovery, with a systolic BP of 65 and haemoglobin 39g/L. Despite a 7-unit blood transfusion (2 units of blood were matched and available preoperatively) and use of inotropes the patient remained haemodynamically unstable. After 2.3 hours, he was returned to theatre for exploration, where an estimated 2L of intra-abdominal blood was found and a bleeding gonadal vein was oversewn. Another 4 units of blood was transfused.

After this second operation, the patient was transferred to ICU ventilated, inotrope-dependent and anuric with evidence of ischaemic hepatitis. His inotrope requirements continued to increase. After discussion with his family, further invasive support was withdrawn and he died the following day.

DISCUSSION

There are a number of areas of concern in this unfortunate case.

Firstly, why was this risky surgery performed in an elderly patient with significant medical comorbidities? The only hint of an answer comes from the patient registration page, where he stated that he had had some blood in the urine. While significant haematuria and pain may be reasonable indications for a palliative nephrectomy in an elderly man with multiple medical comorbidities, this should be well documented. There was no medical comment on the request for admission form and nothing on the handwritten operation notes.

Secondly, who really did the surgery and who was in charge? The patient was admitted under the assessed surgeon. The nursing and medical operation notes have a mixture of the assessed surgeon and another surgeon, but the assessed

surgeon claims in the SCF that although he had performed the patient's previous surgery in 2005 he was only assisting in both of these current operations. Yet it was the assessed surgeon who wrote and signed the handwritten operation notes; it was the assessed surgeon who was called by nursing staff with a problem; and it was the assessed surgeon who apparently discussed his grave prognosis with the patient's family and decided on the withdrawal of invasive care. Disappointingly, there are no typed operation notes that could shed light on this. These should be standard of care.

Thirdly, in retrospect, it is clear there was uncontrolled bleeding before the patient reached recovery. The patient's BP was falling in theatre, he was hemodynamically very unstable on arrival in recovery, and with a haemoglobin of 39g/L he must have been bleeding profusely prior to arriving in recovery. Yet there is no record anywhere of estimated blood loss or sucker bottle contents. It seems likely that undocumented blood loss had occurred in theatre. With the patient's hypotension, another look after closing before leaving for recovery would have been prudent. At the very least, he should have been returned to theatre earlier from recovery.

CLINICAL LESSONS

A lack of clear understanding as to who was actually in charge could have contributed to missing the major source of bleeding, deciding on the return to theatre, and consequent death of this patient.

Case 10: Delay in surgery for a high-risk patient

Orthopaedic Surgery

CASE SUMMARY

A woman in her mid-70s was admitted to hospital with bilateral pleural effusions, chronic right rib fractures and right fractured neck of femur (NOF) following a witnessed fall at her nursing home. Medical history included ischaemic heart disease, a recent ST-elevation myocardial infarction (STEMI), atrial fibrillation, apical thrombus, recent cerebrovascular accident and alcoholism. She was entered into the fractured NOF pathway and underwent anaesthetic and medical review within 24 hours.

Upon admission, the patient was found to be over-anticoagulated secondary to warfarin, with an international normalised ratio (INR) of 3.2, which increased to 4.2 the following day. She was also on clopidogrel and aspirin. It was decided to delay surgery until the INR was corrected, although the patient was given bridging enoxaparin for the first 48 hours. She was deemed ready for surgery 48 hours after admission when the INR had reversed; however, no theatres were available for the next 2 days.

On day 4 of admission the patient had a MET call for decreasing oxygen saturation (71%) and reduced state of consciousness after being given fentanyl and oxycodone for pain relief. She was also charted for a buprenorphine patch, but it is unclear whether the patient had this patch applied. (Of note, the patient had significant renal impairment which may reduce opiate metabolism). The patient was assessed as being narcotised. She had 7 doses of IV naloxone, prompting an initial rally; however, by that evening she had deteriorated. A further MET call was instituted when the patient was found unresponsive with no pulse and agonal breathing. She was pronounced dead that evening.

DISCUSSION

This was an unwell, high-risk anaesthetic patient, which was identified on admission following medical and anaesthetic review. This was discussed with the family on admission and the patient was deemed not for code blue.

There were several issues with this patient's care:

- The decision to consider surgery rather than palliation for a frail nursing-home patient with pleural effusions, rib fractures, recent STEMI and coagulation disorder who was thus highly unlikely to survive the fractured NOF, let alone any operation.

- The provision of bridging anticoagulation (enoxaparin) to a patient with an INR of 3.2 who had been on clopidogrel and aspirin.
- The advisability of treating a patient with known alcohol dependency (and therefore a likely disordered coagulation profile) with 3 different anticoagulants.
- The wisdom of initiating multiple MET calls for this patient, given that the family discussion concluded that the patient was not for code blue, and the risk of death from the combination of premorbid pathology, chest trauma and skeletal trauma was extreme.

CLINICAL LESSONS

A multidisciplinary team would have greatly improved decision-making in this clinical care pathway, particularly regarding pain management and the decision to operate at all on an elderly, compromised patient. Additionally, withholding further anticoagulants until all clotting profile studies were complete should have been considered, particularly given the impaired renal function of the patient.

Case 11: Spinal fracture in patients with ankylosing spondylitis should be treated as unstable

Orthopaedic Surgery (spinal)

CASE SUMMARY

A frail man in his mid-80s slipped and fell in the bathroom, sustaining an injury to his back. The patient had multiple comorbidities, the most significant being ankylosing spondylitis and stiffening of his spine. He also had type 2 diabetes, ischaemic heart disease, dyslipidaemia, chronic kidney disease, chronic airway limitation (emphysema), and had suffered a prior TIA. He had previously undergone a trans-aortic valve replacement, pacemaker insertion for sick sinus syndrome and transurethral resection of the prostate.

Three days after his initial admission, the patient was transferred to a private metropolitan hospital under the care of a neurosurgeon, who had accepted the transfer with advice from an orthopaedic spinal surgeon. A CT scan of the spine indicated a T9 fracture involving 3 columns, with ankylosing spondylitis evident and fusion of the vertebral motion segments above and below (chalk stick fracture). His fracture was treated nonoperatively involving pain relief and fitting of a fracture brace (long Miami J brace) 3 days after the CT scan.

During hospitalisation, the patient developed chest pain so a cardiologist assumed his care. He was also reviewed by a renal physician because of ankle oedema and worsening creatinine. He developed increasing pain and difficulty walking and mobilising from bed to chair. It was noted that he had weakness in one of his legs, but this was fairly mild. The surgeon recommended continued nonoperative management and use of the brace at all times. It was noted by nursing staff that the patient had difficulty with the brace and he had removed it on several occasions.

Increased pain was noted at 13 days following private hospital admission. The surgeon was contacted and requested a repeat CT scan, indicating that the fracture had displaced. Following consultation with a spinal orthopaedic surgeon, MRI of the thoracic spine confirmed compression of the spinal cord with some mild oedema within the cord itself. A decision was made to stabilise the fracture and decompress the thoracic spine. Nursing notes indicate that the patient had increased difficulty walking. There was no documentation of his neurologic status and no record of objective testing (weakness, numbness, bladder or bowel control, or reflexes).

On day 15 of admission, an operation was performed involving decompression of the spinal cord at T9 and fixation of the fracture with pedicle screws from T7–T12 (3 motion segments either side of the fracture) and rods. The patient was managed postoperatively in ICU because of his multiple comorbidities. Nursing staff noted he was able to move his feet and knees overnight; however, the following morning there was no movement below the level of fixation. There was patchy sensation below T9.

Perioperative documentation of the neurologic deficit is unclear. A CT myelogram showed there was no haematoma compressing the cord to account for the neurologic deficit. There was contrast around the spinal cord. It was noted that the screw at T9 on the left side seemed to have entered the spinal canal and was effacing the contrast at that level. The notes stress that there was no evidence of spinal cord compression. It is possible that although the screw did not directly transect the artery of Adamkiewicz—which usually enters the spinal cord somewhere between T9 and T12 on the left side—it may have compressed it and resulted in the subsequent cord ischaemia and paraplegia. It is also possible that the mobile fracture could have injured the artery or the spinal cord prior to surgery, or even during transfer to the operating table. The third possibility is that inflammation and haematoma in the area may have been enough to cause thrombosis of the artery. The surgeon was contacted regarding the findings on the CT myelogram. The surgeon felt that further surgery was not indicated. High dose steroids had been administered.

During postoperative management in ICU the patient's cardiac failure (elevated brain natriuretic peptide), renal failure and chronic airways limitation were optimised as much as possible. Over subsequent days, he developed pneumonia with increasing delirium, probably secondary to aspiration following sedation. He died as a result on day 24 of admission.

DISCUSSION

This elderly man with ankylosing spondylitis sustained a chalk stick fracture of T9, which subsequently displaced resulting in paraplegia. The degree of instability was not recognised, and as such not optimally managed (no spinal precautions, no brace for several days). It is not clear from the available records why a spinal surgeon transferred a spinal fracture case to another hospital for admission under the care of a neurosurgeon who does not routinely care for spinal fractures.

There were no notes in the record as to the neurologic status of the patient, other than that he had been able to walk and later had difficulty. Until day 4 of admission, lower limb neurologic limb observation charts were present in the notes with a nursing assessment (sensation: normal, altered, or decreased;

power: normal, decreased, weakness, no movement). At day 3, it was noted that the patient had altered sensation in both lower limbs. He had some sensation, severe weakness or no movement from 15 days into admission (the next available assessment chart). There was no record of spinal precautions requested or implemented. Repeat imaging was undertaken when it was noted by nursing staff that the patient could no longer walk.

It is not clear why it took so long for this man to get a spinal brace. It is documented in the medical record that during this time he was mobilising under his own power on the ward and no spinal precautions were in place. This fracture is, by definition, unstable as it involves all 3 columns. The risk of instability (the fracture changing position) was increased by the fact that the adjacent motion segments were all stiff. This increased the risk of displacement of the fracture and subsequent spinal cord damage.

Stabilisation of the fracture should have occurred when the injury was diagnosed and significant consideration should have been given to early internal fixation of the unstable fracture. This follows the philosophy that patients are at their fittest when they come into the hospital and treatment should not be delayed unless there is a medical condition that can be improved. The aim should be to get them back on their feet as soon as possible.

It is concerning that this patient's care was taken over by a cardiologist. The cardiologist did address his chest pain and renal failure but it appears that the cardiologist did not understand the significance of the pain and decreasing mobility. It had been noted that the patient had been having increasing back pain and increasing difficulty mobilising. This should have prompted an urgent review by a spinal surgeon.

Nevertheless, the decision to undertake urgent decompression and stabilisation with rods and screws was appropriate. This case demonstrates that surgery is not without risks, and the patient was paraplegic even after the surgery. Again, the only documentation of postoperative neurology was by a member of nursing staff who mentioned that the patient was able to move his knees and ankles. The movement had disappeared after a few hours. There was documentation of paralysis and patchy loss of sensation below T9 by the ICU team starting the following morning.

Even if his surgery had gone perfectly and he recovered strength and sensation, the surgery itself is a physiologic insult. In someone with multiple comorbidities, the insult may have been enough to cause further irreversible decline in the other comorbidities (renal failure, cardiac failure, chronic airway limitation). The significance of the comorbidities cannot be underestimated, in that there is less physiologic reserve to deal with a physiologic insult. Subsequent deterioration of significant comorbidities resulted in death from pneumonia.

CLINICAL LESSONS

A very high level of suspicion of instability is required in fractures involving ankylosing spondylitis. While they can be treated nonoperatively, this needs to be done under very close supervision.

The patient should be managed with full spinal precautions, with nursing staff and ancillary staff that are trained and skilled in this. Neurologic function should be documented carefully and regularly so any change is recognised. There should be repeat imaging upon any change in the patient's condition (change of symptoms, function or neurologic status). If a shift in the position of the fracture occurs, the patient should undergo internal fixation to decrease the risk of further damage.

Case 12: Delayed referral to surgeons for perforation following complex endoscopic retrograde cholangiopancreatography

General Surgery

CASE SUMMARY

A woman in her early-90s was admitted for elective endoscopic retrograde cholangiopancreatography (ERCP).

Although she had normal bilirubin, a CT scan performed one month earlier had indicated likely choledocholithiasis with marked intrahepatic and moderate extrahepatic biliary duct dilatation. An ERCP was attempted around that time but the common bile duct was not cannulated. Attempted wire-guided cannulation of the common bile duct was performed with Jagtome™. The wire preferentially entered the main pancreatic duct so a pancreatic duct stent (5Fr 3cm) was deployed. A needle knife papillotomy was performed to gain common bile duct access. Bile was seen exiting the ampulla but the common bile duct could not be cannulated so the procedure was abandoned. A subsequent magnetic resonance cholangiopancreatography (MRCP) showed a small non-obstructive lesion in the dependent part of the common bile duct, most likely representing a small stone or sludge/debris.

During the current admission, a second ERCP was attempted. The indication for ERCP listed jaundice and recurrent cholangitis in addition to MRCP showing a stone in the common bile duct. The second ERCP also failed, with the common bile duct once again unable to be cannulated. Retroperitoneal extravasation of contrast was noted.

Plans were made for a third ERCP after percutaneous transhepatic cholangiography (PTC) and wire insertion so a rendezvous ERCP procedure could be performed. IV piperacillin was to be given for 24 hours, followed by oral amoxicillin afterwards for 5 days. No cause for concern was noted over the next several days.

One week into admission, PTC was performed using a glide catheter with end hole and Rosen wire successfully placed for a rendezvous ERCP. Nursing review at 21:20 post-procedure documents that the patient's pain score was 8 with worsening abdominal pain. It appears that post-procedure medical review did not occur until the following morning, where it was documented that the patient had required considerable opioid analgesia for pain overnight and was drowsy.

Surgical review occurred later that day for the patient's severe abdominal pain.

A likely diagnosis of biliary peritonitis was documented, with a plan to perform laparoscopic washout and emergency rendezvous ERCP. A CT scan of the abdomen was ordered. This confirmed free fluid in the abdomen, likely bile, but also superior mesenteric artery (SMA) occlusion and ischaemic bowel. At a laparotomy later that night an ERCP rendezvous was performed uneventfully, with passage of a plastic biliary stent and removal of the pancreatic duct stent. However, the small bowel was found to be ischaemic. Palliation was commenced and the patient died the following day.

DISCUSSION

There are no areas of concern with the surgical management of this patient. Review by the surgical team with documentation outlining the likely diagnosis was performed, and appropriate investigations and the correct operative procedure were undertaken expeditiously.

One questions the medical management of this patient. The indication for ERCP listed jaundice; however, there was no evidence that the patient was ever jaundiced, as bilirubin was within the normal range across both admissions. This is a minor point but would suggest that the PTC intervention to facilitate rendezvous ERCP could have been postponed until such time that the interventions could correspond without any delay. There was also no indication in the SCF if a risk assessment had been done—in a case such as this, a risk assessment should have been undertaken as it may have been helpful in decision-making.

The placement of a percutaneous glide catheter does not facilitate biliary drainage as there are no side holes in the catheter, only an end hole with the Rosen wire for the rendezvous to go through. Therefore, leaving the patient with this setup in situ without performing the rendezvous drainage is very high risk for biliary peritonitis and not at all unpredictable. The possibility of biliary peritonitis following percutaneous puncture of the high-pressure biliary tree with subsequent biliary leakage into the peritoneal cavity does not appear to have been entertained by the team performing the ward round and patient review.

It is disappointing that the patient was not reviewed by the medical staff following the PTC when the patient was in considerable pain. It is even more disappointing that elective ERCP was not performed early the following morning after the ward round. There is no explanation for why this procedure was delayed.

CLINICAL LESSONS

Leaving a frail 91-year-old patient with biliary peritonitis for more than 24 hours contributed significantly to the development of SMA occlusion. The retroperitoneal leakage of duodenal content following the ERCP also may have contributed to the acute thrombosis and development of ischaemic bowel.

Case 13: Delay in transfer to tertiary hospital

Neurosurgery

CASE SUMMARY

An Indigenous woman in her mid-40s was transferred from her remote community to a regional hospital in response to increasing confusion, unsteady gait and right-side headache over the preceding week. She had significant comorbidities, including rheumatic heart disease, hepatitis B, prior pulmonary embolus complicating cholecystectomy, macro gammaglobulinaemia, recurrent pelvic inflammatory disease and alcohol abuse. The patient had been seen at the remote community clinic 3 days previously when the symptoms were not as severe; she was discharged after assessment and symptomatic treatment. An alleged assault (patient hit on the head with a rock) had occurred 2 weeks before the second presentation.

Clinical assessment at the admitting regional hospital at approximately 03:15 records the patient as confused with a score of 14 on the Glasgow Coma Scale (GCS) with focal neurological signs. There were some electrocardiogram changes of uncertain origin but these were attributed to her intracranial pathology. A cardiac opinion was obtained. A CT scan of the head showed a large, left-side, chronic subdural haematoma with some mixed density constituents with fresh blood in addition to the chronic component. It was reported that there was significant midline shift and subfalcine herniation. At that time, the blood tests showed the patient's INR and activated partial thromboplastin time at the upper range of normal limits. Haematological investigations found no other significant abnormalities other than the expected derangement of liver tests from alcohol abuse. Consultation was undertaken with the neurosurgical unit at a metropolitan hospital and transfer was recommended, although the timing is unclear. The patient was admitted to HDU at the regional hospital.

At about 05:00, some 24 hours after admission, the patient was noted to have a fluctuating but decreasing level of consciousness. She had been given anticonvulsants at the suggestion of the metropolitan hospital neurosurgery unit. Because of the clinical deterioration, the patient was electively intubated. A repeat CT scan showed no significant change.

More urgent transfer to the metropolitan hospital was arranged. However, while being prepared for transfer, the patient became bradycardic with a fixed dilated left pupil. She was given emergency resuscitation, including dexamethasone and hypertonic saline, and after discussion with the metropolitan hospital it was decided to perform emergency evacuation of the subdural haematoma via burr

holes. This occurred at the regional hospital between 13:30 and 15:30. Two burr holes were made in standard position. A subdural haematoma under pressure was found and evacuated and the cavity was irrigated. The brain re-expanded.

After transfer to the metropolitan hospital a repeat CT scan showed that the subdural haematoma had been substantially evacuated but there was a subarachnoid haemorrhage with brain swelling. It is recorded that the INR was corrected, although the actual INR level before insertion of an intracranial pressure (ICP) monitor is uncertain. The patient was subsequently managed in ICU.

Over the following days, the patient developed a number of complications from the traumatic head injury, including ICP refractory to maximal medical management. Further surgery, in the form of a decompressive craniectomy, was considered inappropriate in view of the very poor prognosis. Furthermore, the patient developed a pneumonic process with *Streptococcus pneumoniae* growing in the sputum. Despite maximal medical measures, ICP continued to increase and the patient developed fixed, dilated pupils. Repeat CT scan demonstrated progressive mass effect and brain compression. The platelet count decreased to $59 \times 10^9/L$ during this time.

After discussion and consideration of the management options and discussion with the family, no further intervention was instituted. The patient died one week after presentation at the regional hospital. The death was reported to the coroner, with the outcome of the coroner's investigation not yet known.

DISCUSSION

This is a tragic outcome with respect to the development of a large, chronic subdural haematoma after an alleged assault on a woman with multiple comorbidities.

Initial assessment at the remote community clinic and subsequent transfer to the regional hospital was appropriate and consistent with recommended protocols. At the regional hospital, the patient was clinically assessed and found to have GCS 14; a CT scan demonstrated a large, left-side, chronic subdural haematoma as the likely cause.

Despite receiving advice from the metropolitan hospital about management of this patient, the recommended urgency and timeframe of transfer to the metropolitan hospital was not recorded. This is an area of concern because urgent transfer for surgical evacuation should have been recommended after the CT scan showed significant mass effect and subfalcine herniation. From the documentation, it is noted that the CT scan was performed at about 08:00 on the day of presentation at the regional hospital. The patient was admitted to the regional hospital ICU at

around 14:00 that day. It was not until after the patient deteriorated at 05:00 the following morning that a more urgent transfer was made.

After the patient had deteriorated, prior to transfer, the correct decision was made for surgical evacuation to be performed at the regional hospital. The records suggest that this was an uncomplicated procedure. However, when the patient was re-scanned at the metropolitan hospital, there was significant fresh bleeding in the left hemisphere and subarachnoid blood. It was recorded that the patient, at that time, had low platelets and a high INR, although this was not the case at the regional hospital. It would seem most likely that these haemorrhagic complications resulted from the presence of a coagulopathy and a rapidly expanding left hemisphere. It is very unlikely that these changes resulted from a surgical iatrogenic trauma at the time of the evacuation of the subdural haematoma.

Thereafter, despite best medical practice, the patient developed multiple complications and eventually died.

CLINICAL LESSONS

The only area of concern on reviewing this tragic case was the absence of documentation around why the patient was not transferred as soon as possible after the discovery of a large chronic subdural haematoma with significant mass effect and subfalcine herniation. It is possible, but not certain, that if the patient was transferred more urgently to the metropolitan hospital, with earlier surgical evacuation of the subdural haematoma before she deteriorated to GCS 4 with fixed dilated pupils, the outcome may have been different.

Abbreviations

ADDS	Adult Deterioration Detection System
ARP	acute resuscitation plan
ASA	American Society of Anesthesiologists
BMI	body mass index
BP	blood pressure
CABG	coronary artery bypass graft
CRP	C-reactive protein
CT	computed tomography
ECPR	endoscopic retrograde cholangiopancreatography
ENT	ear, nose and throat
GCS	Glasgow Coma Scale
HDU	high dependency unit
ICP	intracranial pressure
ICU	intensive care unit
INR	international normalised ratio
IV	intravenous
MET	medical emergency team
MRCP	magnetic resonance cholangiopancreatography
MRI	magnetic resonance imaging
NOF	neck of femur
PACU	post-anaesthesia care unit
PE	pulmonary embolism
PEG	percutaneous endoscopic gastrostomy
PET	positron emission tomography
PTC	percutaneous transhepatic cholangiography
SBO	small bowel obstruction
SCF	surgical case form
VTE	venous thromboembolism



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