



Surgical Safety Update: Cases from the Confidential Reporting System for Surgery (CORESS)

CORESS is an independent charity, supported by the Federation of Surgical Specialty Associations (FSSA)

Professor Frank CT Smith, Programme Director, on behalf of the CORESS Advisory Board.

This series of reports illustrates cases from several surgical specialties, emphasizing common themes across the practice of surgery. Lessons with respect to following protocols, using joint checks by both operators to confirm anatomical orientation (analogous to dual flight deck checks in aviation), and the need for early recognition of the patient who fails to respond following intervention, can be drawn.

We are grateful to those who have provided the material for these reports. The online reporting form is on the website (www.coress.org.uk), which also includes all previous Feedback reports. Published cases will be acknowledged by a Certificate of Contribution, which may be included in the

contributor's record of continuing professional development, or may form part of appraisal or annual review of competence progression portfolio documentation. Trainee contributions are particularly welcome.

Professor Frank CT Smith

On behalf of the CORESS Advisory Board

Bowel perforation in colonic screening patient

(Case ref: 250)

A patient on the national Bowel Cancer Screening Programme, with positive faecal occult bloods, was admitted for colonoscopy. A 40 mm pedunculated low rectal polyp was identified and removed endoscopically, by "piecemeal" excision, after elevation of submucosa with gelofusin, adrenaline and indigocarmine.

Due to the size and appearance of the polyp, MRI of pelvis, to stage disease locally, and computerised tomography (CT) of chest, abdomen and pelvis, to exclude distant metastases, were booked.

CT scan performed 3 days later showed locules of free gas in the rectal wall, suggestive of local low rectal perforation, but with no frank pneumoperitoneum and no free fluid in the pelvis. Some rectal thickening was noted at the excision site. MRI of pelvis at day 6 failed to demonstrate air in the rectal wall. The patient was discussed at colorectal multidisciplinary team (MDT), histology confirming adenocarcinoma with probable lymphatic invasion, with tumour extending to the diathermy margin. The patient was contacted the day after the procedure by the specialist bowel cancer screening practitioner who did not report any concerns as per the standard protocol.

Following discussion at the MDT, the patient was treated by chemoradiation for six weeks and was noted to have a complete clinical and radiological response. Patient remains on a complete responder follow-up protocol with 3-monthly flexible sigmoidoscopies, and MRI pelvis, and six-monthly CT thorax, abdomen and pelvis, for two years.

Reporter's comments:

The local "piecemeal" excision was undertaken in order to obtain larger biopsies for adequate histological diagnosis, and to avoid the need for repeated endoscopy. The polyp initially looked like a benign villous lesion of the rectum. It was not felt that transanal microsurgery (TAMIS) was feasible due to the low position of the polyp. The staging scans however confirmed a localised subclinical perforation, as a result of the "piecemeal" excision, classified as a significant complication in patients undergoing bowel cancer screening.

A dictionary definition of piecemeal is: "characterized by unsystematic partial measures taken over a period



of time". In future, large rectal polyps will be dealt by taking small samples and macroscopic images so that patients can be discussed at the complex polyp MDT. Transanal endoscopic microsurgery (TEMs) or TAMIS will be considered for larger polyps.

CORESS comments:

The colorectal expert on the Advisory Board made the following comments: Endoanal ultrasound might have been useful here. The size of the polyp suggested malignancy and piecemeal excision made complete resection less likely. Early MDT discussion might have provided consensus for an alternative resection strategy. NICE guidance with respect to management of colorectal cancer and endoscopic treatment of polyps can be found at:

<https://www.nice.org.uk/guidance/cg131/evidence/ful-guidance-pdf-183509680>

<https://www.nice.org.uk/guidance/ipg580/documents/overview-2>

Laparoscopic bag disruption & colonic perforation during organ morcellation at laparoscopic nephrectomy (Case Ref: 251)

A 54 year-old man underwent laparoscopic simple nephrectomy for benign disease. The resected kidney was broken up (morcellated) in a laparoscopic retrieval bag, using sponge holding forceps, to allow removal through port site. During the morcellation a tear was identified in the bag. Clinically it was felt likely that the morcellation specimen removal was complete and the case was closed.

Over the following 36 hours the patient became unwell with a fever, leucocytosis and abdominal tenderness. A CT scan suggested a bowel injury. At subsequent laparotomy, a perforating caecal injury with leakage of bowel contents was noted, necessitating bowel resection and stoma formation.

Reporter's Comments:

The patient had undergone previous abdominal surgery causing adhesions. Whenever undertaking morcellation of a specimen, whether manually, or with a mechanical morcellating device, do this with care to avoid damage to the specimen bag with potential spillage of contents. Morcellation should always be undertaken with maintenance of pneumoperitoneum, via an air-seal port device, and under endoscopic visualization.

CORESS Comments:

Most laparoscopic nephrectomies are undertaken retroperitoneally, when there is also risk to the aorta, vena cava and duodenum. Risk of tumour seeding was not a concern for benign disease but would have been, had this procedure been undertaken for malignancy. It is recognised in laparoscopic nephrectomy for cancer, that tumor staging is severely limited by morcellation. Knowledge of the radiologic features (pathology and lesion size, capsule, and vessel involvement) is important in sampling and staging morcellated kidneys removed laparoscopically.

Inadvertent distal anastomosis of femoro-popliteal arterial bypass graft to popliteal vein (Case Ref: 252)

A 75 year-old man with debilitating intermittent claudication of the calf underwent right below-knee femoro-popliteal bypass, using reversed great saphenous vein harvested from the same leg. The distal anastomosis was undertaken by an experienced trainee, but was checked visually by the Consultant, who had undertaken the proximal anastomosis.

On completion, there was good flow in the graft and the incisions were closed. The patient returned to the ward the same evening. Next morning the calf was swollen and an early surveillance duplex scan noted that the arterial bypass graft had been anastomosed to the below-knee popliteal vein instead of the artery. There was excellent flow in what was now an iatrogenic arteriovenous fistula. The situation was explained to the patient, who was taken back to theatre. At the second operation, the distal graft anastomosis was taken

down, the femoral vein repaired with a small patch of superficial vein, and the graft re-anatomosed to the tibioperoneal trunk which was sitting immediately behind and adherent to the popliteal vein.

Reporter's Comments:

The popliteal vessels were exposed by a standard medial infra-geniculate incision. The popliteal vein is often the first major vascular structure to be encountered behind the knee by this approach. It may be difficult to distinguish between the artery and vein, which may often be adherent, or co-located with venae comitantes around the artery. Difficulty in differentiating the vessels is compounded by a lack of arterial pulse in a vessel with a proximal occlusion. Nonetheless the vein is relatively thin-walled and the artery, muscular. Awareness of this potential confusion might have alerted the operator to the scope for misplacing the graft anastomosis.

CORESS Comments:

This case illustrates a lesson in supervision. Did the consultant check the dissection of the popliteal vessels, prior to formation of the anastomosis? Dual checks of the completed anastomosis (analogous to flight deck checks in aviation) might have avoided the final outcome. Similar confusion may arise in distal anastomoses to calf vessels. Pre- and post-anastomotic use of on-table Doppler ultrasound might have helped to differentiate between artery and vein.

Wrong rib resection for neurogenic Thoracic Outlet Syndrome

(Case Ref: 253)

A 32 year-old lady with clinical features of neurogenic thoracic outlet syndrome including paraesthesia in the C8 T1 nerve distribution, and intrinsic muscle wasting in the hand, underwent transaxillary resection of the first rib.

Routine exposure of the first rib was undertaken via an axillary incision, by dissecting the axillary vein to the lateral border of the rib. However, the patient was mildly obese and access in the axilla was difficult, with the view impaired by some bleeding from a collateral branch of the axillary vein. The rib was cleared of intercostal muscles with a rongeur and periosteal elevator, and was eventually resected to a position, posterior to the brachial plexus. Surgery was completed with a redivac drain left in-situ for 24 hours, and the wound closed.

A routine chest x-ray undertaken the next day revealed that, inadvertently, a portion of the second rib had been excised instead of the planned first rib, leaving the offending first rib in-situ.

Reporter's Comments:

Limited vision and assistance compounded problems of access in this procedure. If in doubt, stop, consider the source of problems and institute alternative strategies to deal with these.

CORESS Comments:

Transaxillary resection of the first rib may be a difficult procedure in obese or large patients or those with pronounced axillary musculature. Use of adequate assistance (often two assistants are necessary, one to retract the arm and open up the axillary space), and appropriate long instruments including forceps, scissors, rib shears, periosteal elevators and bone nibblers are necessary. Vision may be improved for the operator, by use of a headlight, lit mammary retractors, or a Vital Vue TM suction device. A laparoscope inserted into the axillary space may enhance the view for assistants.

Identification of the first rib requires visual confirmation of the subclavian vein (anteriorly) and artery (posteriorly) passing over it. Palpation of the rib will usually confirm the flat horizontal nature of the first rib in contrast to the second, and the medially protruding scalene tubercle, to which scalenus anterior is inserted.





Inadvertent SMV ligation at extended lymphadenectomy right hemicolectomy

(Case Ref: 254)

A 52 year-old man was diagnosed with carcinoma of the proximal transverse colon. A lymph node mass was identified on CT close to the origin of the superior mesenteric artery; however, full body CT and PET scan suggested that the disease was potentially curable through radical surgery.

The hospital's Colorectal Cancer MDT recognised that surgery would be technically challenging and two consultant colorectal surgeons were identified to undertake a 'complete meso-colic excision with central vessel ligation' (extended lymphadenectomy right hemicolectomy) operation. At laparotomy, feasibility of resection was confirmed, and the resection and primary ileo-colic anastomosis were completed to the apparent satisfaction of the two consultants.

In recovery, the patient was in pain, vomited and became hypotensive. He had received an epidural and had undergone a difficult and relatively long operation; hence alarm bells did not ring at this point. He was given analgesia and intravenous fluids. His blood pressure responded transiently to fluid; however, it became apparent that the hypotension was refractory to fluid and turning off the epidural. Arterial blood gas lactate was >5 mg/l, approximately 3 hours after his arrival in recovery. Intravenous Metaraminol improved the vital signs, but the lactate further deteriorated and approximately 4.5 hours after his arrival in recovery, a decision was made to return the patient to the operating room.

Re-look laparotomy was undertaken approximately 6 hours after his first arrival in recovery. When the abdomen was explored, it was identified that the superior mesenteric vein had been ligated. A direct reconstruction of the vein was achieved with a PTFE graft and flow re-established. The small bowel was clearly compromised; however, a healthy colour change was seen and it was felt that recovery was likely. The abdomen was temporarily closed with a laparostomy and vacuum dressing and the patient managed on ICU. Prophylactic heparin was given. Unfortunately, the patient further deteriorated and at subsequent emergency re-exploration of the abdomen, the graft was found to have clotted and the small bowel had infarcted. Despite all efforts, the patient died.

Reporter's Comments:

Investigation of this event identified:

- Injury to the superior mesenteric vein is a recognised complication of right hemicolectomy. This complication has been recorded as occurring in approximately 0.2% (1 in 500) routine right hemicolectomies and 1.7% (1 in 59) extended lymphadenectomy right hemicolectomies.
- Pre-operative mapping of major abdominal blood vessels by CT-angiogram has been shown to significantly reduce: a) operating time; b) difficulty in identification of mesenteric vessels; c) volume of intraoperative bleeding.

The Colorectal Cancer MDT wished to alert fellow surgeons to the tragic circumstances of this death, so that colorectal surgeons can:

- Recognise the relatively high risk to the SMV with extended lymphadenectomy colectomy (1 in 59 procedures); this has implications for 'Montgomery-compliant' consent.
- Recognise the utility of CT-angiography in pre-operative mapping of major abdominal blood vessels in high risk colonic tumours.
- Recognise the potential for involving specialist surgeons (HPB/Upper GI) in difficult colectomy operations in both the planning and intra-operative phases.

Finally, if a patient isn't 'right', in recovery after major abdominal surgery, the surgical team should have a low threshold for re-exploration, to identify any technical problem arising from the surgery.

CORESS Comments:

The Advisory Board were grateful to this reporter and his thoughtful comments. The potential complications of this surgery are recognised. Venous grafts with low flow, compounded by local pressure and oedema, are prone to thrombosis, and there was a significant potential risk of this outcome, with associated engorgement and small bowel death.