BOWEL CANCER
PROGRESS IN MORECAMBE BAY

Adenocarcinoma of the colon and rectum is the third most common cancer in the UK and the second commonest cause of cancer death, after breast cancer in women and lung cancer in men. Almost 30,000 new cases were registered in England and Wales in 2002, representing 12% of all new cancer cases and some 16,000 patients died of it. The incidence increases with age. Between 45 and 49 years, the incidence is 20 per 100,000 per year, rising to 300 for men and 200 for women in those aged 75 and older. Approximately 300 new cancers are being diagnosed every year in the Morecambe Bay area.

The so-called 'adenoma-carcinoma sequence' accepts that benign adenoma polyps are the precursors of colon cancer in 95% of cases. Such observations, together with the slow growth of bowel cancers and the opportunity for them to be recognised at colonoscopy 2-3 years before the onset of symptoms provides the rationale for the systematic screening and endoscopy of high risk cases. Surgery is required for 220 cases in the Morecambe Bay area each year and new techniques in surgery and anaesthesia have revolutionised bowel cancer management.

Articles by Susan Meyrick (Nurse Lead at the Cumbria and Morecambe Bay Bowel Cancer Screening Centre), Christine Bronder (consultant surgeon) and Chris Coldwell (consultant anaesthetist) report for the *Journal* on recent advances in the management of this difficult disease.

LAPAROSCOPIC BOWEL SURGERY

Christine Bronder, FRCS

INTRODUCTION AND HISTORICAL PERSPECTIVE

The current standard surgical operation uses an open approach, involving laparotomy. This is associated with significant postoperative pain and systemic disturbance. It usually involves a hospital stay of 8-14 days.

In the last two decades, laparoscopy has been increasingly used to access the abdominal cavity. It was initially introduced by gynaecologists, mainly for diagnostic purposes. In 1987, the first cholecystectomy was performed laparoscopically. It took about eight hours to complete. With advancing surgical skills and improved instrumentation, this has become a routine procedure and usually takes about one hour.

Colonic resection is much more complex. It involves dissection in at least two different areas of the abdomen. In the early 1990s, pioneers of laparoscopic surgery attempted colonic resections, but at that time there was concern as to whether the local recurrence rate was greater than for open surgery. The issue was addressed in a randomised controlled trial, which found no evidence of this.[1] It opened the door for a return to the laparoscopic technique and many centres in the UK are starting to offer it, supported by the National Institute

Minimally invasive surgery. Usually four ports are used and an appendicectomy-sized incision for removal of the specimen

The laparoscopic monitor provides a magnified view

for Health and Clinical Excellence, which has issued guidelines.[2] Its main advantage is reduced pain and stress for the patient, leading to earlier recovery. There are fewer wound infections, incisional hernias and better cosmesis. Earlier return of function leads to a shorter hospital stay.

The operative technique involves establishing a pneumoperitoneum, following which a number of ports are introduced through the abdominal wall. A fibreoptic camera and long thin instruments are used to mobilise the tumour, as well as the adjacent colon and corresponding mesentery. The bowel is divided and the tumour removed through a small abdominal incision. Anastomosis may be performed either outside the abdomen or internally with a stapling gun.

With the introduction of population screening for colo-rectal cancer, it is anticipated that we will find increasing numbers of small cancers and malignant polyps, which are particularly suitable for laparoscopic resection.

The first laparoscopic colon resection within the University Hospitals of Morecambe Bay Trust (UHMBT) was performed by the author on 21 November 2007. Initially, easy cases (slim build, small tumours) were selected and the operations were supervised by an external trainer. With growing experience more complex cases were performed and now most patients are being offered laparoscopic operations, with the exception of locally advanced and low rectal tumours. It is anticipated that, with growing experience, these will also become amenable to laparoscopic resection. UHMBT has now appointed a third consultant, already trained in laparoscopic colon surgery, and will be well placed to drive this development further forwards.

METHODOLOGY

This paper reviews all 35 patients undergoing laparoscopic colonic resection at the Royal Lancaster Infirmary between November 2007 and August 2009. The data were prospectively collected.

EQUIPMENT

The standard laparoscopic stack system (STORZ©) was used with 10mm oblique viewing scopes and Johann's grasping forceps. A harmonic scalpel was used for haemostasis. An endostapler (Ethicon©) was used for intra-corporeal colonic division and a circular stapling gun (Ethicon©) for left-sided anastomoses. Right-sided anastomoses were performed extracorporeally with standard linear staplers. Other extras included shoulder supports to prevent sliding of the patient, when a steep head-down position is required. Wound protectors were used to deliver cancers safely through small incisions without shedding malignant cells.

Co-morbidities	
Obesity	2
Hypertension	9
Chest disease	4
Diabetes	3
Cardiac disease	6
Stroke	3
Vascular disease	2
Renal disease	2
Musculoskeletal conditions	3
Bladder/prostrate	2
No co-morbidities	11

Table 1 Co-morbidities

PATIENTS

The age distribution was typical for colonic cancers with a median of 77 years. There were 18 female and 17 male patients. Selection criteria for this cohort were tumour site and body build, but not co-morbidity. Four patients had benign disease, 21 of 31 cancers were T3. One patient had no residual cancer after radiotherapy. Twelve patients had histological lymph node involvement, eight at N1 and four at N2 level. There were some patients with significant co-morbidities (see table 1).

Patient numbers rose steeply from two operations in a three-month period to 13 after the first few cases were accomplished. Supervision was steady throughout the period, with the numbers of unsupervised operations rising progressively and, increasingly, only complex cases being supervised.

T0 adenocarcinoma	1
T1 adenocarcinoma	1
T2 adenocarcinoma	4
T3 adenocarcinoma	21
T4 adenocarcinoma	4
Adenoma	1
Crohn's disease	1
Chronic diverticulitis	1
Colo-vesical fistula	1

Table 2 Histology

RESULTS

This series had an average of 14 lymph nodes per specimen (national minimum standard 12). None of the specimens had involvement of the histological margins.

Two operations required conversion to open surgery. One was early in the series; this was a man with a body mass index (BMI) of 35 undergoing abdomino-perineal resection of rectum. BMIs over 30 are well known to be a risk factor for conversion. The other was a female with sigmoid carcinoma which, intra-operatively, was found to be adherent to both ureters and the small bowel, rendering the operation more complex than anticipated. Histology subsequently demonstrated that these adhesions were due to endometriosis and that the cancer had been resected completely. Both were supervised procedures.

With respect to complications, there was no mortality. Five wound infections were encountered. Four patients developed an ileus, one of whom required operative intervention. There was one localised anastomotic leak, one episode of atrial fibrillation, one chest infection and one retroperitoneal bleed due to warfarin. An anastomotic bleed was managed conservatively. This was the only patient who required a blood transfusion. Typical intra-operative blood loss was less than 20ml. One patient, who required local excision of the adherent bladder, developed a late colo-vesical fistula.

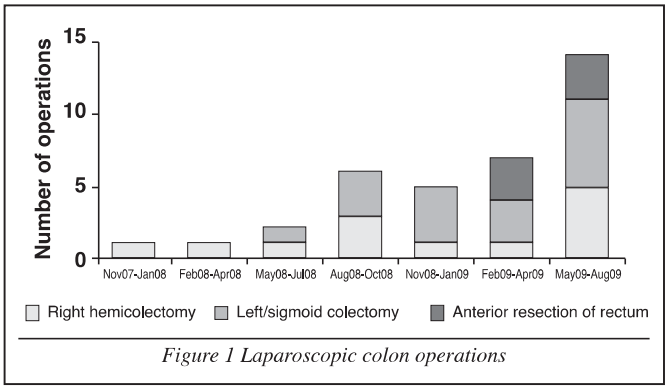

Figure 1 Laparoscopic colon operations

Twenty-one patients had no complications. Several discharges were delayed due to lack of social support. Despite that, half of all patients were discharged from the hospital at or before the seventh post-operative day.

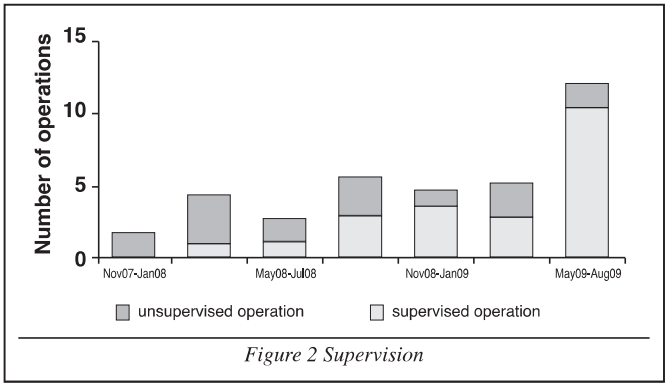

Figure 2 Supervision

DISCUSSION

That there is no resection margin involvement and an adequate lymph node yield suggests that laparoscopic surgery is providing a cancer treatment equivalent to open surgery. The post-operative complication rate is comparable with other reported series. Hospital stay appears to be reduced over that of open surgery, although this was not a randomised trial.

In summary, laparoscopic colon resection appears to be safe and feasible in our colorectal unit.

There was minimal capital investment, but the costs for disposable instruments have risen significantly. A discharge of 1.5 days or earlier, however, will outweigh those extra costs.

Introducing a new technology is an exciting process. It was extremely valuable to have an experienced surgeon's help on site, not only to train myself, but the whole theatre team.

At operation, the dissection itself is slower than in open surgery, but getting in and out of the abdomen is faster. The overall time in theatre has therefore not significantly increased. Post-operative pain relief is achieved with transverse abdominal blocks, replacing epidural catheters. Peri-operative management was largely simple, the patient usually mobilising themselves on day one post-op. With increasing experience, even earlier discharges are being anticipated.

ACKNOWLEDGEMENTS

I'd like to thank my colleague, Ian Crighton, for his encouragement. I am grateful to my trainer, Mr Raja Kapadia (Airedale Hospital), for his ongoing support, to my anaesthetists and my assisting registrars for their patience. The theatre team has been very encouraging and resourceful. Ethicon© has sponsored my training course and is supporting my training program.

REFERENCES

1. Guillou PJ, Quirke P, Thorpe H, *et al*. MRC CLASSIC trial group. Short-term endpoints of conventional versus laparoscopic- assisted surgery in patients with colorectal cancer (MRC CLASSIC trial): multicentre randomised controlled trial. Lancet 2005;365(9472):1718-26

2. http://www.nice.org.uk/nicemedia/pdf/TA105guidance.pdf

THE ANAESTHETIST'S VIEW

Christopher Coldwell, FRCA

As a newly appointed consultant it has been interesting and challenging to have been involved with a new service from (almost!) its beginning. It has been a team approach which has made this successful and good communication has been vital as we have discovered the best ways in which to manage these patients. A multidisciplinary team went to Yeovil to an enhanced recovery programme seminar to help with this. My thanks also go to the theatre team for their invaluable support. Special mention goes to Erica Janta, colorectal nurse specialist, who is especially good at oiling the wheels of communication between the different members of the team!

Although we are used to dealing with the demands of laparoscopic surgery for gynaecology and general surgery in the form of laparoscopic cholecystectomy and hernia repair, colorectal surgery brings new challenges in terms of positioning, the duration of the procedure and pain control options.

The other consideration is that laparoscopic surgery is often wrongly thought of as being less of a challenge to the patient physiologically. Although this will usually be true post-operatively, the insufflation of larger amounts of

carbon dioxide into the peritoneum can produce physiological challenges of its own.

SURGICAL ISSUES OF INTEREST TO THE ANAESTHETIST

Because of the keyhole nature of the surgery, surgeons rely on the patient's position to move structures out of the way rather than conventional surgical retractors. This usually involves the patient having to be positioned in a steep head-down position for several hours. In order to facilitate this, the patient is placed on a non-slip mat in Lloyd-Davis position and shoulder supports are used. This positioning is not without risk and there are reports of brachial plexus injury when patient positioning has not been ideal. It is common to find often quite marked dependent oedema of the head and neck at the end of the procedure.

This head-down position, along with the pneumoperitoneum, can cause marked ventilation problems which will be discussed later. Because of the position, patient access for the anaesthetist can be difficult intraoperatively and meticulous care with monitoring cables and intravenous lines is needed.

Previous laparoscopic surgical cases have tended to be of limited duration with even the most difficult laparoscopic cholecystectomy rarely taking more than two hours. The prolonged nature of laparoscopic colorectal cases means that extra care must be taken with patient positioning and warming if complications are to be avoided. Use of an anaesthetic technique which uses drugs which are more rapidly excreted can be used to try and ensure a rapid recovery.

PHYSIOLOGICAL EFFECTS OF PNEUMOPERITONEUM

To create a space for the surgeons to work in, carbon dioxide is insuffulated into the peritoneum; this has a number of physiological effects which must be considered before embarking on this type of surgery.

There has been a general perception that because a surgical procedure is performed laparoscopically it follows that, therefore, the stresses on the patient are less. Research has consistently shown this to not be the case.

Creation of the pneumoperitoneum is a potent stimulant of the sympathetic nervous system, causing a rise in the systemic vascular resistance. In addition, the additional pressure in the abdominal cavity causes marked changes in fluid flow within the body. Venous return to the heart is decreased and blood is displaced from organs such as the liver. Blood can also pool in the legs or the upper body, depending upon the position the patient is in.

Although the interplay between these factors is complex, a fall in venous return is usually observed, but with a paradoxical rise in arterial blood pressure as the increase systemic vascular resistance more than compensates for this.

These factors mean that for patients with significant cardiovascular disease then careful consideration should be given to whether laparoscopic surgery is the correct choice. The European Society of Cardiology has recently stated in it's perioperative guidelines that 'Laparoscopic procedures demonstrate a cardiac stress similar to open procedures'.[1]

Large volumes of carbon dioxide can be used to create the pneumoperitoneum, some of which is inevitably absorbed into the circulation. We routinely monitor the amount of carbon dioxide returning to the lungs during an anaesthetic and during laparoscopic surgery we would expect to have to increase ventilation rates in order to ensure that carbon dioxide levels remain within safe limits. With some patients, despite our best efforts, the combination of lung disease, body shape, pneumoperitoneum which splints the lungs, and patient position can mean that it is impossible to keep the carbon dioxide level within safe limits. On occasion this may necessitate converting the procedure to an open one. For this reason, some of the patients whom we might perceive as having the most to gain from laparoscopic surgery, those with severe chest disease, may not be suitable for it.

PAIN CONTROL

Pain control for this procedure requires great skill and a modest investment in equipment. The ideal is to reduce the requirement for opioids which can cause nausea and ileus and generally slow the process of recovery.

Historically, the use of local anaesthetic through a catheter placed before the operation in the thoracic epidural space has been the 'gold standard' for major laparotomy for providing pain relief, obtunding the stress effect of surgery and reducing the risk of ileus. Given the discussion above about the 'stress' associated with laparoscopy it is arguably important to do the same even though the surgery appears to the non-specialist less extensive.

The reality is, however, that studies (albeit not on Lancaster patients!) show that up to 30% of epidurals fail to provide adequate analgesia for abdominal surgery. Patients may be subjected to hours of sub-optimal pain relief before defeat is admitted and they are switched to a form of opiate analgesia, usually a patient-controlled analgesia pump. Add to this the risks of hypotension (a consequence of central sympathetic block which accompanies the epidural), the risk of bowel oedema from the use of excess fluids to treat the hypotension, the rare but dangerous complication of epidural haematoma/infection and the difficulties of relying on epidural analgesia for the successful development of this surgical programme become obvious.

In Lancaster, we decided we would circumvent these potential problems by using the new technique of ultrasound-guided tranversus abdominis plane (TAP) blocks – 20ml of long-acting local anaesthetic is injected into the lateral abdominal wall in the triangle of Petit between internal oblique and transversus abdominis muscles. This causes anaesthesia of the anterior abdominal wall and parietal peritoneum from the umbilicus downwards (T7 to L1). This can give up to 18 hours good quality pain relief and has been shown to considerably reduce opioid requirements. The technique requires modest investment in ultrasound imaging equipment: such investment is now required by the National

Institute for Health and Clinical Excellence to support the safe and effective use of nerve blocks for surgery. Under ultrasound guidance it is also possible to insert small catheters into the tranversus abdominis plane to give repeat doses of local anaesthetic in the post-operative period. We are investigating the possibility of providing this service at the Royal Lancaster Infirmary.

REFERENCE

1. Guideline for pre-operative cardiac risk assessment and perioperative cardiac management in non-cardiac surgery Available at: http://www.escardio.org/guidelines-surveys/esc-guidelines/GuidelinesDocuments/guidelines-perioperative-cardiac-care-FT.pdf

THE CUMBRIA AND MORECAMBE BAY BOWEL CANCER SCREENING CENTRE

Nurse-led cancer screening services

Susan Meyrick, RGN; Helen Mason; Cynthia Stringfellow; Colin Brown, FRCP

INTRODUCTION

In 1996, Hardcastle and colleagues from Nottingham reported that testing the stools of healthy subjects between the ages of 55 to 75 years for blood (faecal occult blood testing) and providing colonoscopy for positive cases, could result in earlier detection of bowel cancer, with a 16% reduction in overall mortality rates.[1] Similar experiences were reported from Tayside, Scotland, and in other parts of Europe.[2] This provided the rationale for planning a national NHS bowel cancer screening programme (BCSP), the third such programme after cervical and breast cancer screening. However, it also raised concerns around the safety of the widespread colonoscopy intervention for otherwise fit subjects, who would be put at risk of perforation and potential mortality risk.

THE TEAM

The Cumbria and Morecambe Bay Bowel Cancer Screening Centre team consists of:

Specialist Screening Practitioners
Sister Susan Meyrick
Staff Nurse Sara Underwood
Staff Nurse Christine Pearson
Staff Nurse Jane Chester
Staff Nurse Claire Speller

Doctors
Dr Colin Brown, Clinical Director
Mr Frank Hinson, Colonoscopy Lead
Dr Nicholas Mapstone, Histopathology Lead

Managers and Administrative Staff
Cynthia Stringfellow, Business Manager
Helen Mason, Administrative and Health Promotion Officer
Anne Hardy, Administrative Officer

PLANNING AND SETTING UP THE CENTRE

The NHS started to systematically focus on improving endoscopy services around 2001.

- The Modernisation Agency facilitated improvements in service efficiency and reducing waiting times using 'service re-design' methodology.

- In 2003, the National Clinical Endoscopy Lead, Dr Roland Valori, led a national service improvement programme through a process of 'clinical engagement'. He appointed Clinical Endoscopy Leads for each of 28 Strategic Health Authorities (SHA). Dr Colin Brown served as SHA Endoscopy Lead for Cumbria and Lancashire from September 2003 to December 2007, and was responsible for leading change in all the local Trust endoscopy services, improving waiting times, providing safer and higher quality services from a patient's perspective, measuring services every six months using a web-based 'global rating scale' (GRS) and supporting peer accreditation of endoscopy services by the Joint Advisory Group for Endoscopy (JAG), a multi-collegiate body. JAG+ accreditation for endoscopy units is required to continue training endoscopists and for provision of bowel cancer screening services.

- Preliminary results from a pilot BCSP centre in Rugby showed that colonoscopy had the potential to detect cancer in 10% and adenoma in 30% of patients offered endoscopy. National experts collaborated to provide training courses and formal accreditation examinations involving direct observation of practical skills (DOPS) for screening endoscopists. The JAG+ accreditation process was set up for endoscopy units and by 2006 the first three bowel cancer screening units participated in the programme

In Cumbria and Lancashire, collaborative planning between the SHA, public health network, primary care trust