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Mini Review

Colorectal Cancer: Where have we Come from, where are we Now and where are we Going?

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Abstract

Emergency and terminal presentation is gradually being superseded by early detected cancer, assisted by screening programmes and imaging, can now help to tailor treatment, in particular MRI in rectal cancer. Advances in oncological therapy, the realisation that early rectal cancer can be removed safely by local means with abundant new technologies and the scenario of Complete Response have revolutionised the way colorectal cancer is now managed.

Laparoscopic and now more recently, robotic resection are flourishing assisted by LAPCO Training and the boundaries for cancer clearance advance, steered by neoadjuvant therapy. Restorative surgery is increasingly undertaken and stenting to relieve obstruction, both in a bid to cut stoma formation.

We sit on the precipice of a genetic revolution which may have further beneficial implications for colorectal cancer patients.

Keywords: *Colorectal Cancer; Review; Screening; Treatment*

Introduction

It is timely entering 2018 to observe many huge achievements in colorectal cancer management, led by many inspirational characters in our field of colorectal surgery. This article, whilst clearly unable to acknowledge everyone, will highlight some of the major recent advances.

We have moved from an emergent symptom based scenario where liver metastasis often signified terminal illness and presentation with obstruction was commonplace towards an era where screening increasingly detects early stage disease, often amenable to endoscopic resection and advanced disease is managed using a combination of oncological, radical multi-visceral multidisciplinary resection [1] and reconstructive ortho-plastic techniques [2] following appropriate image guidance.

Diagnosis and Staging

Symptom based diagnosis is common place, though in the UK the two week wait pathway for suspected colorectal cancer patients [3] has highlighted both to GPs and patients the key features to be aware of; whilst this process may smooth the diagnostic pathway it has not produced the anticipated stage shift in disease [4] and has often thrown up some difficult decision making in frail elderly patients diagnosed who may not be suitable for any treatment.

Colonoscopy [5] is the modality used to investigate most symptomatic patients with huge advances [7] via dedicated training programmes [7] with JAG (Joint Advisory Group on Gastrointestinal Endoscopy) accreditation now required. This has enabled higher completion rates, polyp detection rates (ADR) and reduced complications. Historically Barium enema was also employed though comparison with CT colonoscopy showed that this technique was not only superior in polyp and cancer detection but also more/as acceptable [8].

Bowel cancer screening has been introduced in the UK using biennial faecal occult blood from aged 60 - 74 though earlier in Scotland (50 - 74) [9]. Positive cases are offered a colonoscopy which has led to high yield of early colorectal neoplasia [10] – Faecal Immunochemical Testing (FIT) is likely to be introduced 2019 and has been shown to have a higher proportion of true positive cases – FIT is likely to further increase demand for colonoscopy – these measures combined with the advent of bowel scope [11], one off flexible sigmoidoscopy aged 55, are likely to further increase the yield of early stage colorectal cancer, thus improving outcome in the screened population.

With the realisation that polyp cancers detected, usually on screening, presents a particular management challenge guidelines have been produced to help minimise unnecessary subsequent surgery in this group [12].

CT scanning has been essential in staging disease however in rectal cancer MRI staging [13] in addition helps surgeons and oncologists determine whether the circumferential resection margin is clear and if not ascertain the need for neoadjuvant therapy. This modality has revolutionised the management and classification of rectal cancer staging. In addition endorectal ultrasound is useful in planning local excision of rectal lesions [14].

Local Excision

Local excision of rectal polyps can be undertaken according to their position and stage. Prior recognition that polyp morphology helped determine risk of malignancy [15] has enabled investigation and case selection based on endoscopic and imaging findings, several techniques for polyp and early rectal cancer resection have been adopted including Transanal Minimally Invasive Surgery (TAMIS), Transanal Endoscopic Operation (TEO), Transanal Endoscopic Microsurgery (TEM) and endoscopically: Endoscopic Mucosal Resection (EMR) and Endoscopic Submucosal Dissection (ESD); each have their proponents but in effect the explosion in polyp and early rectal cancer detection combined with flourishing technologies has enabled this area to expand, such that a national programme: Significant Polyp and Early Colorectal Cancer (SPECC) has started to try and formulate registries and guidelines for patients and professionals respectively. Indeed these treatments coupled with either external beam or contact radiotherapy for T1/T2 cancers [16] have led to staggering results and many patients not requiring radical therapy.

Colorectal Cancer Resection

Radical colonic and rectal resection has long been recognised to have the best chance of cure, however local recurrence in rectal cancer pre-MRI was minimised by adopting TME surgery [17]; this negated the need for adjuvant and neoadjuvant radiotherapy in many cases and huge training programmes have led to worldwide improvements in R0 rectal resection and lowered local recurrence. MRI guided TME surgery is thus the gold standard in resectable rectal cancer care.

Laparoscopic Colorectal resection has flourished [18] and virtually all standard segmental colorectal resections can be attempted laparoscopically in a suitable patient – this method has been standardised via the LAPCO (National Training Programme for Laparoscopic Colorectal Surgery) training programme [19] which has effectively turned the methodology of training into a science [20], enabling inexperienced laparoscopic surgeons to learn to perform complex colorectal resection [21]. Coupled with enhanced recovery programmes [22] rapid discharge from hospital with improved outcomes not only in terms of recovery but survival have been noted using laparoscopic surgery [23].

However challenges noted [24,25] for laparoscopic rectal cancer resection have led others to adopt robotic resection in this scenario which in relatively small numbers shows no disadvantages versus laparoscopic resection [26,27]. The inherent wrist action of the robot may well hold several advantages and is relatively early in its adoption thereof, however bearing in mind recent comparisons of open and laparoscopic TME showed non-inferiority for pathological outcomes [28,29] there could well be a place for robotic rectal cancer surgery to aim to provide superior pathology.

Where patients have needed an APER, surgeons have aimed to eradicate "wasting" [30] of the specimen near the levator and undertake a traditional extra-levator approach to enable R0 resection; particularly after radiotherapy and with excision of the coccyx, plastic surgical flaps or absorbable mesh reconstruction can confer benefit [31].

Pathology

Grading of rectal cancer specimens has been shown to improve surgical technique, and those with the highest grades typically have the best outcomes [32]; within the mesorectum the significance of extramural vascular invasion [33] is not yet fully determined however might signify micrometastases and hence the need for neoadjuvant chemotherapy. Subsequent analysis of colonic specimens suggests that complete mesocolic excision (CME) might similarly lead to better outcomes though this still needs assessment [34].

Compromised CRM Rectum/Advanced Colonic Primary

Where the mesorectal envelope is compromised, neoadjuvant chemoradiotherapy is usually given to attempt to shrink the cancer and enable subsequent resection; a proportion of these patients have been observed to have a complete resolution of their cancer (complete response) on imaging and many of these when serially monitored (%) never need radical surgery [35,36]. This begs the question whether more patients with non-compromised CRM could follow a similar pattern if given neoadjuvant therapy, thus minimising further the need for surgery.

A trial is underway to determine whether patients with high risk operable colon cancer benefit from perioperative chemotherapy, in terms of 2 year recurrence.

Advanced Disease Beyond TME

In advanced disease there are now many options – for pseudomyxoma or peritoneal extension peritonectomy combined with heated intra-peritoneal chemotherapy (HIPEC) has a major advantage [37]– where the sacrum is involved sacrectomy [38] or High Subcortical Sacrectomy (HISS) [39] can be employed to help achieve R0; Intra-operative radiotherapy (IORT) can provide a radiation boost to surrounding threatened tissues – when planning this therapy staging laparoscopy can be extremely useful as cases lengthy and this can determine setting and teams required for complex major resection. These boundaries for cancer clearance keep being advanced [40] and along with appropriate neoadjuvant chemoradiotherapy allow increasingly more patients to become resectable whom were previously deemed palliative. Coupled with cyberknife for irresectable regions, radiofrequency ablation (RFA) for lung and liver lesions and portal vein embolization allowing more complex liver resections to occur increasing numbers of advanced primary and recurrent colorectal cancer patients are suitable for R0 surgery [41] often requiring complex plastic flap reconstruction [42]. Obviously R0 resection is imperative as R1 and R2 resections have a higher local and systemic recurrence rate.

Synchronous resection of colorectal primary and liver metastasis is undertaken [43] however is usually reserved for segmental colonic and simple liver resection to minimise the complication rate.

Anastomosis, Stoma

Increasingly restorative surgery is undertaken to minimise stoma formation in patients. In the emergency setting colorectal stenting has been employed to relieve obstruction as a bridge to elective surgery (CREST trial in progress), in difficult colorectal settings [44] and to palliate obstruction with inoperable disease. Similarly on table lavage and primary anastomosis (often defunctioned) is increasingly employed versus Hartman procedure.

There will always be a group of patients who for either curative surgery or severe incontinence reasons will require APER but wide variation is thought to exist for this operation even within similar healthcare systems. As a result surgeons are continually striving to undertake lower anastomoses, and intersphincteric resection usually after radiochemotherapy. This enables a handsewn low colo-anal anastomosis in selected patients, who are sometimes additionally furnished with an irrigating caecostomy prior to or on ileostomy reversal to enable better function which may be additionally combined with biofeedback. It is believed that in many of these patients function will improve after time, as with anterior resection syndrome [45].

Indeed, many surgeons are also incorporating trans-anal total mesorectal excision (TATME) [46] either to commence or complete TME dissection [47] and assist inter-sphincteric resection however oncological efficacy and safety studies are required to determine its benefit.

Laparoscopic colonic anastomosis is increasingly constructed intracorporeally [48] which enables a pfannensteil incision and shorter stay and lower incisional hernia rates. Where length is an issue for colorectal anastomosis despite flexure mobilisation the right colon can be flipped creating an adequate reservoir in many [49].

Family Cancer and Genetics

Colorectal cancer genetics are well established in terms of polyposis registries [50] and hereditary nonpolyposis colorectal cancer (HNPCC), however with DNA sequencing increasingly available [51] we are almost certainly entering a time when bespoke therapy both pre, operative and post-operative will be administered according not only to our staging and grade and site but also genetic makeup.

Risk and Governance

The UK National Bowel Cancer Audit [52] has enabled reporting on a national basis, individual surgeon reporting and also the development of specific colorectal risk scores [53] and enabled surgeons to predict risk [54], thus facilitating more detailed informed consent to take place.

Summary

There have been huge innovations in colorectal cancer management, in particular screening, MRI and image guided surgery, laparoscopic and minimally invasive surgery and enhanced recovery.

With increasing multi-visceral resection, safer ITU and anaesthesia we can operate on a greater proportion of cancer patients, but similarly observe many who have responded completely to chemotherapy or had polyp cancer resected. With an ageing population the important decisions will be who do we direct these treatments and investigations, with the abundance of technologies, and who should be undertaking these treatments, and where?

Whilst stomas are often lifesaving, further work assessing quality of love and the impact of stomas is required. We are reaching an era where rectal cancer assessment, management and surgery will require so many facets and equipment that it will almost become a subspecialty itself. It lies on the precipice of a genetic revolution which may have further beneficial implications for colorectal cancer patients.

Summary Points

- Emergency and terminal presentation of colorectal cancer is gradually being superseded by early detected cancer, assisted by screening programmes and advances in imaging.
- Population screening is carried out by biennial faecal occult blood testing; Faecal Immunochemical Testing (FIT) is likely to be introduced in 2019.
- There is an increasing role for local excision of rectal polyps, and several new techniques have been adopted.

- Virtually all standard segmental colorectal resections can be attempted laparoscopically suitable patients.
- Advances in neoadjuvant chemoradiotherapy allow increasingly more patients to become resectable whom were previously deemed palliative.
- Increasingly restorative surgery is undertaken to minimise stoma formation in patients.

Conflicts of Interest

Nil declared.

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