A Few Words about Colon

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Abstract

The human body is composed of a large number of organs, each of which has its own special shape and function. Multiple organs form systems in which their action complements each other by serving a common task. For example, many organs serve to digest food: the organs of the oral cavity, pharynx, esophagus, stomach, and small and large intestine with associated glands such as the liver and pancreas. Each of these organs has its own function, but they all have a common role in digestion and absorption of food. The colon is the part of the digestive system that continues to the small intestine. In the colon, the remnants of digested food end up, from which most of the nutrients are resorbed in the small intestine. Residual water is resorbed in the colon and the remnants of digested food are stored.

Key Words: Colon; Pain; Injury; Bleeding; Trauma

Introduction:

Long Hartmann or rectal stump blowout is a dreaded complication of an often already complicated patient scenario [1]. To backtrack for a moment, consider what prompts a Hartmann operation and consequent rectal stump creation in the first place. Indications for this initial intervention are any colonic pathology requiring resection (injury, obstruction, ischemia, perforation) in a setting where primary anastomosis is deemed unsafe (poor tissue integrity, distal location of anastomosis, patient comorbidity, hemodynamic instability, all of which may negatively impact wound healing). Traditionally, the procedure involves rectosigmoid resection with end colostomy creation, leaving a defunctionalized rectal stump beginning at or just proximal to the peritoneal reflection. This stump is thus primarily extraperitoneal. However, the technique has been applied to all types of colonic resection, generating a stump comprised of any length of colon that may begin as far proximal as the ascending colon. This so-called long Hartmann extends well into the peritoneal cavity, and, particularly when the stump is filled with retained fecal matter, it is easy to appreciate that stump dehiscence can be a catastrophic event.

Pain:

Pain from the anal canal is felt principally on defaecation, and is protracted, cramp-like and distressing [2]. There may be a background ache. Excessive stretching of the anal canal may cause a sharp, splitting pain, sometimes described as if something is tearing. If the patient has a fissure, something is!
The presence of pain may help to make a diagnosis, because haemorrhoids and rectal cancer are not usually painful.
An annular lesion at the rectosigmoid junction may obstruct the lumen of the bowel and cause lower abdominal colic.

Bleeding:

Blood passed per rectum may be fresh or altered. When blood is degraded by intestinal enzymes and bacteria, it becomes black and acquires a characteristic smell [2]. Such a black, tarry stool is called a melaena. The blood must come from high in the intestinal tract, usually from the stomach or duodenum, to have time to

parboiled rice, more especially the imported parboiled rice. The turn black before it reaches the rectum.

Recognizable blood may appear in four ways:

- mixed with the faeces,
- on the surface of the faeces,
- separate from the faeces, either after or unrelated to defaecation,
- on the toilet paper after cleaning.

Given the conditions in which a Hartmann stump is created, one can intuitively recognize the presence of a risk of stump dehiscence (blowout), as the very factors that preclude the safety of anastomotic healing are the same factors that threaten a stump suture or staple line [1]. Of course, the first step to combatting a complication is prevention. At the time of stump creation, optimization of tissue integrity and blood flow is paramount, starting with including only viable, noninflamed tissue at the stump margin. This helps ensure that the bowel edges are adequately apposed and that the staples or sutures successfully capture. Also, both tissue necrosis and inflammation-induced tissue edema impair blood flow, which is necessary for nutrient delivery and debris removal as the stump margin heals.

Meticulous surgical technique serves to preserve tissue integrity. Bleeding along wound edges may initially be taken as encouraging evidence of good blood flow, but hemostasis should be promptly achieved, as any significant hematoma formation at a wound edge can impede perfusion as well as provide a nidus for infection that would threaten the integrity of the closure. Similarly, adequate removal of any surrounding contamination is important for limiting impending infectious and inflammatory changes along the wound edge, which predispose to wound dehiscence. Another very important consideration, especially when creating a long Hartmann stump, is selecting a stump margin well within the domain of segmental blood supply and avoiding watershed regions. This is less of an issue with rectal stumps due to the rectum's redundant blood supply via the inferior mesenteric artery (superior rectal artery), internal iliac artery (middle rectal artery), and pudendal artery (inferior rectal artery).

Injury:

Penetrating trauma accounts for most of the colon and rectal injuries in the civilian setting [3]. Even today, there remains debate regarding the optimal treatment of colon injuries, with the preponderance of evidence supporting primary closure of the colonic wounds and segmental resection (with primary anastomosis) in the majority of the settings. Most colonic injuries are quickly diagnosed during the initial exploration and mobilization of the colon. With two-thirds of the rectum being extraperitoneal and bordered by the bony pelvis, detection and direct management of a localized rectal injury is a challenge. Rectal injuries are usually a result of pelvic fractures or penetrating trauma. Generally, extraperitoneal rectal injuries are managed with proximal diversion. With intraperitoneal injury, the segment of injured bowel should be thoroughly inspected, particularly missile injuries that are most common, through-and-through injury. This requires adequate mobilization of the colon to visualize the entire circumference of the bowel wall. As

highlighted above, initially controversial, right- or left-sided injury of the colon can be closed primarily. If the colon injury is so extensive that primary repair is not possible or would compromise the lumen, a segmental resection should be performed. Depending on the setting, the remaining proximal segment can be anastomosed to the distal segment or a proximal ostomy and Hartmann's procedure can be performed. If the distal segment is long enough, a mucous fistula should be established. Documented rectal injuries, below the peritoneal reflection necessitate a diverting colostomy. Presacral drainage (exiting from the perineum) is not universally endorsed; it can be considered for lower one-third rectal injuries only.

Colonoscopy:

Colonoscopy is considered the best test for confirming the source of LGI (lower gastrointestinal) bleeding and excluding ominous diagnoses, such as malignancy [4]. Advances in technique have significantly improved its diagnostic accuracy, which ranges from 72 to 86% in the setting of LGI bleeding, and allowed it to largely supersede barium enema as the investigation of choice. Caecal intubation rates for colonoscopy are greater than 95% and it is relatively safe with low morbidity and mortality rates. In subjects undergoing only diagnostic procedures, the major complication rate was 0.1%. Perforation of the colon, which requires surgical intervention more frequently than bleeding, occurs in less than 1% of patients who undergo diagnostic colonoscopy and may be seen in up to 3% of patients who undergo therapeutic procedures such as polyp removal, dilation of strictures, or laser ablative procedures.

Uncertainty remains regarding the optimal timing of colonoscopic intervention for LGI haemorrhage. Endoscopy performed within 24 hours of presentation potentially improves diagnostic and therapeutic opportunities and reduces length of stay. However, a 24-hour emergency endoscopy service is often difficult to provide and good bowel preparation is required to ensure adequacy and sensitivity of the procedure. Good bowel preparation is difficult to achieve in the acute setting but colonoscopy remains an efficient and cost-effective approach to LGI bleeding. Flexible sigmoidoscopy is an easier intervention to perform and yields all the diagnostic and therapeutic intervention of colonoscopy but only for left-sided lesions.

Colon cancer may be asymptomatic and discovered as a result of screening programs or become symptomatic due to bleeding, obstruction, or metastatic disease [5]. Both symptomatic and asymptomatic proximal colon cancer is definitively diagnosed by colonoscopy. For smaller lesions, it is important during colonoscopy that the endoscopist marks the site of the lesion via India ink tattoo, to facilitate accurate intraoperative localization during resection (especially important if approached laparoscopically). A chest x-ray and CT of the abdomen and pelvis is indicated to identify distant metastases. Preoperative carcinoembryonic antigen (CEA) may be obtained to assist in postoperative surveillance of recurrence. Though its use is currently being questioned, preoperative mechanical bowel preparation is still most commonly utilized at this time.

Cancer:

Colorectal cancer is predominantly (95%) adenocarcinoma, with

colon cancer affecting more than twice as many people as rectal cancer [56It may start as a benign polyp but may become malignant, invade and destroy normal tissues, and extend into surrounding structures. Cancer cells may migrate away from the primary tumor and spread to other parts of the body (most often to the liver, peritoneum, and lungs). Incidence increases with age (the incidence is highest in people older than 85 years) and is higher in people with a family history of colon cancer and those with inflammatory bowel disease (IBD) or polyps. If the disease is detected and treated at an early stage before the disease spreads, the 5-year survival rate is 90%; however, only 39% of colorectal cancers are detected at an early stage. Survival rates after late diagnosis are very low.

The incidence of carcinoma of the colon and rectum increases with age. These cancers are considered common malignancies in advanced age. In men, only the incidence of prostate cancer and lung cancer exceeds that of colorectal cancer. In women, only the incidence of breast cancer exceeds that of colorectal cancer. Symptoms are often insidious. Patients with colorectal cancer usually report fatigue, which is caused primarily by iron deficiency anemia. In early stages, minor changes in bowel patterns and occasional bleeding may occur. The later symptoms most commonly reported by the elderly are abdominal pain, obstruction, tenesmus, and rectal bleeding.

Trauma:

Injuries to the small intestine and colon are found in less than 5% of victims of blunt abdominal trauma but are the most common injuries sustained after penetrating abdominal trauma [7]. Despite a large experience with these injuries in both military and civilian environments, management of hollow viscus injuries remains controversial. Important questions to consider in the care of a patient with a hollow viscus injury include need for ostomy in colon trauma, management of resected bowel after damage control surgery, consideration for stapled versus handsewn anastomosis, abdominal skin management, duration of antibiotics, and presacral drainage of rectal injuries.

Multiple prospective randomized trials have been performed to answer the question of repair versus anastomosis in colon trauma. For partial circumference colon injuries that do not require resection and full anastomosis, primary repair is clearly preferred. It is also clear that the majority of penetrating civilian colon injuries do not require resection. For this reason, the trials that have been done have not accrued enough patients with destructive colon wounds to definitively answer the question of what to do after resection for colon trauma. It is also unclear if blunt, destructive colon injuries should be managed in the same manner as penetrating injuries. One prospective and two retrospective studies have evaluated relatively large numbers of patients with destructive colon wounds requiring resection. In all series, management was left to surgeon discretion. Risk factors that may be related to anastomotic leak—and therefore may lead one to manage a patient with a colostomy—include underlying medical condition, transfusion requirement of 4 or more units of packed red blood cells, hypotension on presentation, or Abdominal Trauma Index >25. It is also generally not recommended that anastomosis be performed in the case of severe bowel wall edema or poor perfusion to the segments of colon in question. It is clear from the literature on colon trauma that regardless of how a colon injury is managed, the risk of abdominal septic complications exceeds 20% in this patient population.

Diagnostic Test:

No discussion of diagnostic test validity would be complete without considering the implications of test performance as they relate to the implementation and efficacy of disease screening programs [8]. Screening tests (such a PSA, mammography and colonoscopy) are used to identify asymptomatic individuals with early-stage, potentially curable disease. In general, screening tests aim to classify individuals with regard to their probability of disease, rather than establishing a definitive diagnosis. The ultimate goal of screening is to alter the prognosis of a given condition by identifying patients in an early phase of the disease, thereby allowing the timely institution of effective therapy. For a screening program to be worthwhile and effective, the disease of interest (and screening test) must fulfill a number of criteria including: 1) the disease must be common and an important health problem; 2) the natural history of the disease should be well-defined and there should be an identifiable latent or presymptomatic stage; 3) if left untreated, the disease must be accompanied by significant morbidity or mortality; 4) there must be an accepted and effective treatment for patients with the disease and there must be some benefit, in terms of morbidity and/or mortality, when the disease is treated in the presymptomatic versus the symptomatic stage; 5) there must be a suitable screening test that is generally acceptable to the population; 6) the cost of screening (including diagnosis and treatment of diagnosed patients) must not be excessive relative to the overall costs of medical care; and 7) screening must be a continuous process and not a "one-time" event. For most widely available screening tests, including mammography, Pap smears and PSA testing, most, but not all, of these criteria are fulfilled

CT:

Often, due to the subtle and gradual clinical deterioration, there are delays in taking patients to theatre [9]. While it may be the systemic signs that herald the patient's deterioration, the diagnostic question is whether this is due to bleeding, perforation, mesenteric ischaemia, pancreatitis or sepsis and where the source may be. Within the abdomen there may be temptation to confirm the diagnosis with imaging, but one should carefully appraise the benefits of this as opposed to direct intervention with a laparotomy. In the case of a suspected colonic anastomotic leak, a CT scan and contrast enema are complementary, with the former the investigation of choice with the possibility of additional percutaneous drainage. However, a negative scan does not exclude a leak completely and the time and delays of the transfer to and from the CT scanner should be considered against the benefit of rapid drainage from an immediate return to theatre. Likewise, an ultrasound may show free fluid but that will very rarely change your management. Simple blood tests, particularly the white cell count and blood gases, may guide you towards a specific cause of deterioration. Take all possible cultures (blood, pus, urine or sputum, etc.) in order to direct therapy in the longer term.

In more subtle postoperative changes, contrast CT arterial imaging may exclude an ischaemic cause. Isolating a focus of infection may require a labelled leukocyte scan. However, in

acute deterioration there is not the time to delay and a laparotomy may be indicated.

Occasionally, negative laparotomies are performed as part of a diagnostic process when faced with a deteriorating surgical patient. This is not necessarily a wrong course of action, but extended delay of the patient who does need to return to theatre will invariably lead to a worse outcome.

Management:

Any patient with a worsening abdominal exam, new onset or persistent fever of unclear origin, or who has a change in output from previously placed peritoneal drains should undergo stat CT scan, preferably with oral and IV contrast [10]. New onset rectal bleeding can also be a subtle finding and should raise suspicion of colonic ischemia. CT findings of colonic wall thickening in patients with acute pancreatitis maybe non-specific as the peri-pancreatic inflammation can make it difficult to identify early bowel injury. Other signs concerning for bowel injury include retroperitoneal air or the presence of a thrombus or narrowing of the middle colic vessels. Delay in diagnosis of colonic injury is a common cause for the development of sepsis and multisystem organ failure.

Once colonic injury is suspected, the surgeon will have to consider the status of the abdomen before deciding management options. If the abdomen is open and the colon easily accessible, the preferred treatment is exploration, resection of the perforated colonic segment, abdominal washout, and either ileo-colonic or colo-colonic anastomosis depending on location. The degree of intra-abdominal contamination and the patient's hemodynamic status should also be considered as diversion with end colostomy may be the preferred procedure. If the patient is in extremis, the surgeon should consider a damage control approach by resecting the perforated segment, quick abdominal washout, and temporary closure with abdominal wound VAC, leaving the colon in discontinuity. The patient should then be taken back to the ICU for aggressive rewarming and resuscitation prior to definitive management, restoration of continuity, or placement of an ostomy.

Conclusion:

The colob is the part of the digestive tract that continues to the small intestine. It is about a meter and a half long and makes up one-fifth of the total length of the intestine in humans. The colon receives intestinal porridge from the small intestine, from which it absorbs water and salt and collects undigested remains. It contains many bacteria that have the ability to synthesize vitamins that the body absorbs.

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