Role of colonic stents in the management of colorectal cancers

Jayesh Sagar

Jayesh Sagar, Department of Surgery, Medway Maritime Hospital, Gillingham ME7 5NY, United Kingdom

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Correspondence to: Dr. Jayesh Sagar, DNB, FRCS (Ed), MD, Surgeon, Department of Surgery, Medway Maritime Hospital, Windmill Rd, Gillingham ME7 5NY, United Kingdom. jsagar_2001@yahoo.co.uk Telephone: +44-7875-104480

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Abstract

Colorectal cancer is one of the commonly encountered cancers across the Western World. In United Kingdom, this constitutes third most common ranked cancer and second most common ranked cause of cancer related deaths. Its acute presentation as a malignant colonic obstruction imposes challenges in its management. Colonic stent has been used for many years to alleviate acute obstruction in such cases allowing optimisation of patient’s physiological status and adequate staging of cancer. In this review, current literature evidence regarding use of colonic stent in acute malignant colonic obstruction is critically appraised and recommendations on the use of colonic stent are advocated.

Key words: Colorectal; Cancer; Surgery; Emergency; Stent

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Core tip: Although colonic stents have been used for years to treat acute malignant colonic obstructions, current evidence based on the systematic review and randomised controlled trials do raise concerns about its impact on the long term outcomes. Its use has not been recommended in acute suspected malignant colonic obstruction as a bridge to surgery due to evidence of its impact on recurrence rates; however there is enough evidence to suggest its use as a palliation. In patients with multiple co-morbidities with high American Society of Anaesthesiologists grades, colonic stent may be considered as an alternative option to emergency surgical procedure as a bridge.

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BACKGROUND

Colorectal cancer is one of the commonly encountered cancers across the Western World. In United Kingdom, it constitutes third most common ranked cancer and second most common ranked cause of cancer
related deaths. Although surgical intervention remains the mainstay of treatment for colorectal cancers, radiotherapy and chemotherapy do have role especially in locally advanced and metastatic disease. With the implementation of colorectal screening programme, presentation at an early stage is expected with better outcome. However, about 8%-13% of patients with colorectal cancers presents with acute colonic obstruction\(^1\)\(^-\)\(^3\). In elective settings, individual would undergo adequate staging of cancer before initiation of treatment in a controlled environment, but acutely presenting patients with colonic obstruction need immediate intervention to relieve the obstruction. Thus this group of patients represents challenges to the colorectal team as emergency surgery in these patients either in the form of defunctioning stoma or primary resection is related with significantly high complications and mortality and in some cases, inadequate treatment. The alternative approach would be to stent the obstructing lesion to alleviate the obstruction. This would allow adequate time to stage the disease, achieve best optimal health status of the patient and initiation of any neoadjuvant treatment. However, there have been controversies about the use of stent in the management of acute suspected malignant colonic obstruction. Recently, European Society of Gastrointestinal Endoscopy has published the guidelines regarding the use of colonic stent in acute malignant colorectal obstruction\(^4\).

### ANATOMICAL LIMITATIONS

Although colonic stents can be placed in any part of colon, considering the alternative surgical approach in the form of primary resection and anastomosis, colonic stents are usually preferred in left sided colonic obstructions. Until recently, the reported randomised controlled studies (RCT) comparing stenting vs emergency surgery for malignant colonic obstruction omitted colonic lesions proximal to splenic flexure except one\(^3\). Similarly, all published RCTs except one\(^5\) had excluded rectal cancers from their study population due to known higher failure rates and complication rates. Apart from colonic obstruction from colorectal pathology, extra colonic pathology including carcinomatosis peritonei can also cause colonic obstruction. In these cases, colonic stenting may be considered for palliative purposes but this is associated with lower technical and clinical success rates and higher complication rates\(^6\)\(^-\)\(^8\). Regarding presence of inflammatory bowel disease (IBD) in conjunction with malignant colonic obstruction requiring colonic stent, there is no evidence as IBD would change approach to deal with malignant colonic obstruction as management of malignant obstruction would override the management of IBD, however one needs to be aware of existing disease in proximal or distal colon when considering surgical or stent option in these cases. This review mainly focused on the obstruction caused by primary colonic malignant pathology.

### COLONIC STENT

Although there is much published regarding the use of colonic stents in suspected malignant colonic obstruction, there is no evidence of colonic stenting as prophylaxis in asymptomatic patients. Prophylactic stenting is not recommended due to potential risks associated with stenting. There have been reports suggesting less effectiveness of colonic stents in peritoneal carcinomatosis cases although there has not been any major study published looking at the role of colonic stenting in these cases. There are generally no contraindications for the colonic stenting except perforation of colon. The only absolute contraindication for colonic stenting is colonic perforation. Outcomes following stent placement are not affected by patient’s age and American Society of Anaesthesiologists (ASA)/physiological status\(^9\)\(^-\)\(^14\) as they are the main two risk factors predicting mortality and morbidity with any procedure. Pre-stenting investigation in the form of computed tomography (CT) with contrast enhancement is the investigation of choice with a sensitivity of 96% and specificity of 93%. It also helps to define the aetiology in 81% of cases and level of stenosis in 94% of cases. There is an added advantage of local lymphovascular and distant staging of tumour. Flexible sigmoidoscopy may be added in dubious diagnosis on CT scans. Synchronous colonic tumours are present in around 3%-4% of patients with colonic cancers\(^15\)\(^-\)\(^18\). Knowledge of these synchronous lesions may change the definitive treatment of colonic cancers. However, routine adequate imaging with CT colonography or visualisation with colonoscopy to detect these synchronous lesions is not feasible in acute presentations and is not recommended. If patient receives successful colonic stent, colonoscopy through stent or CT colonography can be considered as a safe procedure\(^19\)\(^-\)\(^22\) to look for any synchronous lesions. In cohort of patients diagnosed with suspected malignant colonic obstructions, there would be few patients with benign cause of their obstructions. In two RCTs, the benign obstructive lesion was found in 4.6%\(^23\) and 8.2%\(^24\) of patients suspected of malignant obstructions. As definitive pathological confirmation in acute situation is not feasible, if indicated, stenting should be performed in suspected malignant obstruction without waiting for pathological diagnosis. Brush cytology or tissue biopsy can be obtained during stent placement if possible, however if there is any risk of obscuring views due to bleeding following biopsy, it can be deferred for a later time. In contrast to malignant pathology, stenting should be avoided in suspected diverticular strictures or obstruction due to high risk of perforation\(^25\). However, the risk of having underlying malignant lesion in patients with diagnosed diverticulitis on CT scan was quoted to be 2.1% in one systematic review\(^26\).

Bowel preparation is debatable before stent placement considering the obstructive nature of the disease and there are no published reports related with the use of bowel preparation in such cases. In most of these
patients, although colon distal to obstruction is usually empty due to peristaltic movements, an enema can be used to facilitate visualisation before stent procedure. Antibiotic prophylaxis during stent placement is not indicated due to very low incidence of clinical manifestation of bacteremia\textsuperscript{[13,27]}. Colonic stent placement can be achieved either endoscopically or radiologically but combination of endoscopy and fluoroscopy is recommended. Retrospective studies have reported similar success rates following endoscopic and radiologically placed stents but have shown greater technical success rates with combination technique\textsuperscript{[14,28-30]}. There is also a definitive learning curve for an endoscopist to perform colonic stents. Couple of noncomparative studies suggested performance of at least 20 procedures with increased technical success rate and reduction in the number of used stents by endoscopist\textsuperscript{[21,22]}. There is some suggestion that endoscopists experienced in therapeutic endoscopic retrograde cholangiopancreatography would benefit from translating skills in stent placement procedures\textsuperscript{[13]}. Dilatation of colonic obstructing stricture is not recommended due to high risk of perforation\textsuperscript{[29,31,32]}; however, this recommendation is based on retrospective studies only.

The available colonic stents can be divided broadly into two groups, covered and bare or uncovered stents. The potential factors responsible for success of stent insertion also include length and diameter of stent. Two met analysis comparing covered stents against bare stents showed no difference in technical and clinical success and complication rates, however, bare stents had significantly higher tumour ingrowth rates but had lower migration rates\textsuperscript{[28,30]). Smaller body diameter stents (< 24 mm) are associated with higher migration rates\textsuperscript{[13,27-29]}. Considering the shortening after stent deployment, it is recommended to use long enough stent, in addition to the length of obstruction, to cover at least 2 cm on either ends\textsuperscript{[40]. There is evidence of no difference in outcomes among different stent designs\textsuperscript{[41-46]. The other major factor that affects stent outcomes is stentability of the obstruction. There is evidence that success rates are high in short segment obstructions with higher technical and clinical failures in obstructions > 4 cm\textsuperscript{[38,47]}. Similarly, although the clinical and technical success rates were similar in complete and impending (subtotal) obstruction, complication rates, especially perforation were higher in complete obstruction\textsuperscript{[48].

**COLONIC STENTS AS A BRIDGE TO SURGERY**

Although colonic stenting seems to be an apparent management option for acute large bowel obstruction in potentially curable and resectable cases, there has always been controversy about their use as a bridge to surgery. Due to an ability to convert an emergency condition to elective situation permitting opportunities for staging and optimisation of patient’s condition, stent seems a viable option, however current evidence failed to show its superiority over traditional surgical options. Eight systematic reviews\textsuperscript{[49-56]} and seven randomised controlled trials\textsuperscript{[23,24,57-61]} have been published in last few years comparing emergency surgery with pre-operative colonic stenting for acute suspected malignant colonic obstruction. Two of the randomised controlled trials were closed prematurely due to higher complication rate in the stent group\textsuperscript{[23,24]} while one was closed early due to high complication rate in the surgical patients\textsuperscript{[60].

The most recently published systematic review performed meta-analysis of all published seven randomised controlled trials covering more than 180 patients in each group\textsuperscript{[60]. Mean technical success rate of 76.9% was achieved following stent placement. There was no difference in post procedure/surgical mortality in either group but overall complication rate and permanent stoma rate were noted to be lower in the stent group. The primary anastomosis rate was also high in stent group. The outcomes regarding cost effectiveness of stents were unclear. From this systematic review, it is clear that colonic stenting in acute setting has some definitive advantages compared to emergency surgery. However, one needs to consider long term impact of colonic stent insertion in terms of oncological outcomes, especially in cases of curable and resectable cancers at presentation.

There has been some trepidation raised regarding the impaired oncological outcomes following placement of colonic stents in patient having potentially curable cancer. This concern increases more so with potential complication in the form of perforation. Three randomised controlled trials have compared the medium term oncological outcomes subsequent to stent placement till the surgery vs primary surgical resection\textsuperscript{[58,60,62]. All of these trials were of small sample size and comparatively shorter follow-up periods. The Chinese study included 48 patients; 24 offered stents till the surgery and 24 offered emergency surgical procedure\textsuperscript{[58]. In this study, two of 13 patients in surgery arm and 11 of 22 patients in stent arm who had curative resection developed recurrent disease. However there was wide gap in the median follow-up period; 32 mo in open surgery group and 65 mo in stent group, this difference did not reach statistical significance. The 5-year overall survival rate was 27% and 48% in open surgery and stent groups respectively although it was statistically insignificant. The Spanish study included 28 patients; 15 in stent arm and 13 in surgery arm\textsuperscript{[60], although this study was closed prematurely due to high rate of complications in the form of anastomotic leak in the surgical group, the disease recurrence was noted in eight out of 15 cases in stent arm and two out of 13 cases in surgical group at mean follow-up of 37.6 mo but this was not statistically significant. The third study represents outcomes of Dutch stent in 2 trial\textsuperscript{[62]. This included follow-up of patients who had only curative treatment. It had 32 patients in emergency surgery arm and 26 in stent arm. The median follow-up was 36 and 38 mo respectively. Five-
year overall recurrence rate was 25% (8 patients of 32) in surgery arm and was 42% (11 of 26) in stent group. Local recurrence rate was 9% (3 out of 32) in surgery group and was 19% (5 out of 26) in stent group. Although overall five-year recurrence rate was statistically significant, local recurrence rate failed to reach that. The cumulative overall recurrence rate was 83% in patients with clinical or subclinical stent related perforation and was statistically significantly higher compared to emergency surgery group and non-perforated stent group.

The above findings made one to rethink about the use of these stent in acute suspected malignant colonic obstruction as a bridge till surgery in cases with potentially resectable and treatable tumours. Although the above studies had small number of patients and the follow-up period was variable and not long, it seems obvious that placement of these stent is not without its potential adverse impact in form of higher local and overall recurrence rates. These findings were supported by another large comparative prospective study showing higher local recurrence rates in stented patients aged ≤ 75 years[63]. Until we have results from large number of patients with adequately designed randomised controlled trial, the oncological outcomes of stents needs to be weighed against the outcomes following emergency surgical intervention. As published studies did not reveal any significant difference in postoperative mortality and morbidity in either group, colonic stent cannot be recommended as a bridge till surgery in acute suspected malignant colonic obstruction. However, if surgical risks outweighs the long term benefits as in patients with increasing age, multiple co-morbidities and increasing ASA, stents can be considered as an alternative option.

If colonic stent is used as a bridge till surgery, optimal time interval of five to ten days should be considered between stent placement and resection surgery[22]. This is based on the facts that this time would allow patient to recover his/her physical and nutritional status. If resection surgery is delayed longer, it would impose more challenges performing surgical resection due to maturing of scar tissues, especially when considering laparoscopic resections.

**COLONIC STENT AS A PALLIATION**

It is getting clearer from above discussion that although colonic stent is not recommended as a bridge to surgery, it obviously has a role in the palliation. Two published meta-analysis including randomised and non-randomised comparative studies compared the colon stent and emergency surgery as palliation[64,65]. The clear advantages of lower postoperative mortality, reduced intensive and overall hospital stay with earlier start of chemotherapy were evident in the stent arm but the clinical success rate was statistically significantly higher in surgery arm. There was no statistically significant difference in the post-operative complications; early complications were more common in surgery arm while late complications were reported more frequently in stent arm. Although the technical success rate in stent arm was 88% to 100%, colonic perforation, stent migration and re-obstruction were reported complications. These findings favour colonic stents in a palliative setting in acutely presented suspected malignant large bowel obstruction.

Successful deployment of colonic stents in these cases allows the advantage of starting chemotherapy at an earlier stage. However, chemotherapy also raises the suspicion of increased complication rates of stent placement, especially of colonic perforation. Several retrospective studies have reported increased stent related colonic perforation in patients who were treated with bevacizumab[13,38,66]. Single meta-analysis published significantly higher rate of colonic perforation in patients who were on bevacizumab in comparison to those who were on chemotherapy without bevacizumab or not on chemotherapy at all[38]. As the newer anti-angiogenic drugs such as regorafenib and aflibercept work alike bevacizumab, colonic stenting is not recommended in patients who are considered for treatment with anti-angiogenic agents. Clinically, this may impose difficulty as presentation of acute large bowel obstruction may be patients’ first clinical presentation and it would be difficult to assess their suitability for chemotherapy with antiangiogenic agents at that time. However, patients presenting as an acute large bowel obstruction with known colonic cancer and on anti-angiogenic agents are not recommended to have colonic stent. There is limited evidence of increased stent related complications in patients who are already on chemotherapy without anti-angiogenic agents before stent placement however tumour shrinkage leading to stent migration due to chemotherapy may be a concern. Apart from stent related perforation, stent failure, re-obstruction and stent migration, other common potential complications include pain, tenesmus, incontinence and fistula formation. When used as a palliation, re-stenting is a viable option in expert hands in cases of stent migration or obstruction.

**CONCLUSION**

Colonic stents are associated with lower mortality and morbidity compared to emergency surgery in cases of acute suspected malignant large bowel obstruction. However, current evidence does not recommend use of colonic stent as a bridge till surgery in these cases but it is a preferred treatment to relieve obstruction in palliative settings. In patients with multiple medical co-morbidities, poor performance status and increased ASA, colonic stent can be considered as an alternative option as a bridge till surgery but careful discussion with patients about potential adverse impact on long term oncological outcomes is recommended.

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