Review

Current management of acute malignant large bowel obstruction: a systematic review

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KEYWORDS:
Malignant large bowel obstruction; Systematic review; Surgical treatment; Colonic stent

Abstract

BACKGROUND: The management of colonic obstruction has changed in recent years. In distal obstruction, optimal treatment remains controversial, particularly after the appearance and use of colonic endoluminal stents. The purpose of this study was to review the current treatment of acute malignant large bowel obstruction according to the level of evidence of the available literature.

METHODS: A systematic search was conducted in PubMed, MEDLINE, Embase, and Google Scholar for articles published through January 2013 to identify studies of large bowel obstruction and colorectal cancer. Included studies were randomized and nonrandomized controlled trials, reviews, systematic reviews, and meta-analysis.

RESULTS: After a literature search of 1,768 titles and abstracts, 218 were selected for full-text assessment; 59 studies were ultimately included. Twenty-five studies of the diagnosis and treatment of obstruction and 34 studies of the use of stents were assessed.

CONCLUSIONS: In view of the various alternatives and the lack of high-grade evidence, the treatment of distal colonic obstruction should be individually tailored to each patient.

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Acute large bowel obstruction is the initial presentation in 7% to 29% of patients with colorectal cancer and represents 1 of the more common causes of surgical emergency. The most common location for obstructing colorectal cancer is the sigmoid colon, and >75% of tumors are located distal to the splenic flexure.

Emergency presentation of colorectal cancer is more common in advanced stages of the disease, and frequently occurs in elderly patients, with significant associated comorbidities.

Although resection of the tumor is the “gold standard” for the treatment of malignant colonic obstruction, in the past 2 decades, self-expanding endoluminal colonic stents have been introduced in the therapeutic armamentarium as the initial maneuver in the management of distal colonic obstruction, aiming to relieve the obstruction and avoid emergency surgery. Surgery is proposed as a second-stage definitive treatment once the acute obstruction has been resolved. Several studies have shown the feasibility of managing acute malignant obstruction by colonic stenting. However, there is ongoing debate on the advantages of this strategy compared with emergency surgery in this scenario.

Drs Frago and Biondo contributed equally to this work.

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The aim of this study was to perform a systematic review of the current treatment of acute malignant large bowel obstruction according to the level of evidence of the available literature, because there is still controversy, especially in the treatment of distal colonic obstruction.

Methods

Search strategy

A comprehensive search was performed for diagnosis and treatment studies of large bowel obstruction and colorectal cancer. The primary aim of the study was to analyze, on the basis of current evidence, results from the treatment of both proximal and distal malignant colonic obstruction in patients in whom either emergency tumor resection was performed or stents were placed in the emergency department and resection was deferred to elective surgery. We conducted a subanalysis of the diagnostic method of obstruction and of the survival benefit if colonic stents were placed both as a “bridge to surgery” or for palliative patients.

The term “bridge to surgery” has been defined as the placement of a stent as a first treatment of the obstruction syndrome followed by delayed oncologic surgery.

A systematic search was performed in PubMed, MEDLINE, Embase, and Google Scholar for articles published from January 1985 through June 2013. Medical Subject Headings used were “colectomy,” “stents” or “SEMS” (self-expanding metallic stents), and “management,” combined using the “AND” operator with “colorectal cancer obstruction” or “large bowel cancer obstruction.” Other search terms included were “colonic stent,” “colorectal stent,” “large bowel obstruction,” “colonic obstruction,” “obstructed left and right colon,” and “Hartmann’s procedure.” All articles reviewed were written in English. All abstracts were reviewed, and the relevant ones were selected.

Inclusion and exclusion criteria

Case reports were excluded, as well as articles on elective surgery. Perforated colon cancer, noncomparative studies, nonresective treatment of the primary tumor, proximal stenting, benign or extraluminal obstruction, and palliative local treatments such as high-dose-rate intraluminal brachytherapy or yttrium-aluminum-garnet laser treatment. Studies that did not differentiate the results of palliative from curative treatment were also excluded.

For the evaluation of the use of stents, only narrative reviews, systematic reviews, meta-analysis, and randomized prospective trials were evaluated. The observational studies including “survival” as a keyword after “stent placement” were included even if the indication for stenting was palliative.

Only studies analyzing ≥1 of the following items were selected for evaluation: prognostic factors, diagnostic methods, treatment, resective surgery, stent, postoperative morbidity and mortality, and survival.

After identifying the relevant titles, the studies were reviewed independently by 4 reviewers (each pair of reviewers checked half of the study items), and data from comparative studies and randomized clinical trials were extracted. When different studies described the same item, the level of evidence was evaluated. Discordance between reviewers was resolved by discussion or consultation of a third reviewer.

Because of the extensive literature published in the past few years on stents, we have divided this section into different paragraphs to ease the reading comprehension: a brief general introduction based on narrative reviews, palliative treatment, bridge to surgery, and systematic reviews and meta-analysis.

Data extraction

The present systematic review was performed according to the guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) group. Because of the small number of randomized controlled trials (RCTs) on obstructing colon cancer, the assessment of the quality of many of the included studies was based on the list of 12 items proposed by the Methodological Index for Non-Randomized Studies.

The quality of evidence and the strength of recommendations were applied using the proposal of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system. Quality of evidence was assigned to several of the analyzed parameters.

Results

The general literature search identified a total of 1,768 publications. The abstracts were reviewed, resulting in 218 articles to be assessed for eligibility, which were subjected to the modified Methodological Index for Non-Randomized Studies tool. Therefore, 59 articles were chosen for review: 11 randomized studies, 3 systematic reviews and meta-analyses, 2 meta-analysis, 6 systematic reviews, 7 narrative reviews, 21 cohort studies, 4 case series, 2 case-control studies, 2 society consensus documents, and 1 propensity score analysis.

On the basis of previously described criteria, 159 full-text articles were excluded. Reasons for exclusion were as follows: 6 studies included elective treatment, 19 studies included patients with perforations and obstructions, 14 studies did not differentiate between bridge and palliative stenting treatment, and 120 studies did not report survival analysis of the stent groups.

Fig. 1 shows a flowchart of the selection of articles. Included studies for the systematic review are reported in Tables 1 and 2.

Diagnosis and staging

The clinical presentation of a colonic obstruction includes abdominal pain, abdominal bloating or distension,
and the absence of bowel movements, with or without nausea and vomiting, depending on the competency of the ileocecal valve. In many cases, this syndrome is associated with severe systemic imbalance due to fluid and electrolyte sequestration in the gut and endotoxemia.7–9

Traditional studies have defined obstruction as the absence of gas or bowel movements for \( R \geq 24 \) hours associated with abdominal distension and the visualization of dilated colon on an abdominal plain x-ray.5 The studies included in this review used these criteria for the inclusion of patients nonhomogeneously. Some studies included patients with complete obstruction combined with patients at risk for obstruction. This renders the interpretation of data more difficult.

Controlled trials comparing different treatment modalities for colon cancer are scarce, and most of the available studies are retrospective.10

**Hydrosoluble contrast enema**

When the clinical suspicion of colonic obstruction is made and in the absence of signs of peritoneal irritation, the classical radiologic study recommended has been a hydrosoluble contrast enema.11 This study can confirm the diagnosis, and it aids in defining the location of the obstruction. The observed sensitivity of a contrast enema in the diagnosis of colonic obstruction is 80%, with specificity of 100%.9,11,12 (quality of evidence low, weak recommendation).

**Abdominal computed tomography**

The availability of computed tomography in most emergency departments has permitted this radiologic tool to become the most commonly used for colonic obstruction diagnosis. It has sensitivity of 96% and specificity of 93%. Computed tomography can locate the obstructing lesions in 96% of cases and make correct diagnoses in 89% of cases.11 The use of triple contrast (endovenous, oral, and rectal) or the use of a computed tomographic enema allows an even more precise localization of the level of obstruction. It can also distinguish between an intraluminal cause of obstruction and an extraluminal compression. Furthermore, computed tomography obtains the correct local and distant staging of cancer in a high percentage of patients9,11,12 (quality of evidence low, strong recommendation).

**Colonoscopy**

Colonoscopy allows a direct visualization of the distal colon and the obstructing lesion and can exclude other causes of obstruction. One of its disadvantages is that it is not readily available in all emergency departments. A potential advantage is that it can be used for the insertion of an endoluminal stent9,12 (quality of evidence low, strong recommendation).

**Treatment**

Two groups of patients can be defined according to the location of the tumor with respect to the splenic flexure: those with proximal and distal obstructions. The choice of surgery will depend on the location of the obstruction, the general condition of the patient, the surgical findings, and the experience or resources of the hospital team.7

**Proximal colonic obstruction**

Right hemicolectomy has been accepted as the treatment of choice for proximal colonic tumors. A primary anastomosis between the small bowel and the colon has been considered safe in the emergency setting, with published anastomotic leak rates of 2.8% to 4.6%.9

A recent publication including 173 patients who underwent resection and primary anastomosis for proximal colonic cancer obstruction found an anastomotic leak rate of 16.4%.7 The authors suggested that a strict selection of high-risk patients with proximal obstruction was needed to offer safer surgical options, such as adding a diverting ileostomy to resection and primary anastomosis (quality of evidence low, weak recommendation).

**Distal colonic obstruction**

In the past 60 years, the surgical treatment of distal colonic obstruction has evolved from a 3-stage procedure (proximal colostomy, second-stage tumor resection, and third-stage stoma closure) to management with 1-stage procedures. Prior studies have shown that staged resection does not improve survival and is instead associated with...
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<tr>
<th>Study</th>
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<th>Number of patients (stent/surgery)</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Ghazal et al (2013)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>30/30</td>
<td>Comparable oncologic outcomes; stenting lower morbidity</td>
</tr>
<tr>
<td>Kavanagh et al (2013)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>23/26</td>
<td>Stenting no impact on stoma rates, disease progression or survival</td>
</tr>
<tr>
<td>Cennamo et al (2013)</td>
<td>Stent vs surgery</td>
<td>Yes</td>
<td>178/175</td>
<td>Stenting improve primary anastomosis, stoma formation and permanent stoma</td>
</tr>
<tr>
<td>Kim et al (2013)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>25/70</td>
<td>Oncologic outcomes were comparable</td>
</tr>
<tr>
<td>Knight et al (2012)</td>
<td>Stent vs surgery</td>
<td>Non</td>
<td>15/88</td>
<td>Similar long-term survival</td>
</tr>
<tr>
<td>Cirocchi et al (2012)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>97/100</td>
<td>Stenting as a bridge to surgery provides surgical advantages</td>
</tr>
<tr>
<td>Lee et al (2012)</td>
<td>Stent vs surgery</td>
<td>Yes</td>
<td>36/52</td>
<td>Stenting lower morbidity and mortality than emergency surgery</td>
</tr>
<tr>
<td>Ye et al (2012)</td>
<td>Stent vs surgery</td>
<td>Yes</td>
<td>175/201</td>
<td>Stents no advantage than emergency surgery</td>
</tr>
<tr>
<td>Tan et al (2012)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>116/118</td>
<td>High rates of perforation, primary anastomosis and lower stoma after stenting</td>
</tr>
<tr>
<td>Alcántara et al (2012)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>15/13</td>
<td>Bridge to surgery lower morbidity, hospital stay and long-term survival</td>
</tr>
<tr>
<td>Ho et al (2012)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>20/19</td>
<td>Bridge to surgery tendency toward less morbidity and mortality</td>
</tr>
<tr>
<td>Zhang et al (2012)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>232/369</td>
<td>More primary anastomosis, less morbidity, no effect on survival after stenting</td>
</tr>
<tr>
<td>van Hooft et al (2011)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>47/51</td>
<td>Stenting could be used as an alternative treatment</td>
</tr>
<tr>
<td>Pirlet et al (2011)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>30/30</td>
<td>Bridge to surgery failed to demonstrate lower need for stoma placement</td>
</tr>
<tr>
<td>Sagar (2011)</td>
<td>Stent vs surgery</td>
<td>Yes</td>
<td>102/105</td>
<td>Stenting no advantage over emergency surgery</td>
</tr>
<tr>
<td>Varadarajulu et al (2011)</td>
<td>Stent vs colostomy</td>
<td>Yes</td>
<td>778/5,868</td>
<td>Stenting less costly, shorter hospital stay, fewer complications</td>
</tr>
<tr>
<td>Frago et al (2010)</td>
<td>Stent vs surgery</td>
<td>Yes</td>
<td>43/12</td>
<td>In palliative stage IV, stenting may be less successful than previously thought</td>
</tr>
<tr>
<td>Cheung et al (2009)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>24/24</td>
<td>Stents are as a safe and effective bridge to laparoscopic surgery</td>
</tr>
<tr>
<td>Kim et al (2009)</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>35/350</td>
<td>Stents are possibly associated with adverse oncologic outcomes</td>
</tr>
<tr>
<td>Faragher et al (2008)</td>
<td>Stent vs surgery</td>
<td>Only</td>
<td>29/26</td>
<td>Stents less morbidity than palliative surgery with similar long-term survival</td>
</tr>
<tr>
<td>Dastur et al (2008)</td>
<td>Stent vs surgery</td>
<td>Yes</td>
<td>19/23</td>
<td>Stents as bridge to surgery may result in a higher primary anastomosis rate</td>
</tr>
<tr>
<td>Dionigi et al (2007)</td>
<td>Stent</td>
<td>Yes</td>
<td>366</td>
<td>Stents low morbidity and mortality as a bridge to surgery and palliative</td>
</tr>
<tr>
<td>Tilney et al (2007)</td>
<td>Stent vs surgery</td>
<td>Yes</td>
<td>244/207</td>
<td>Stenting offers effective palliation; bridge to surgery no differences in survival</td>
</tr>
</tbody>
</table>
high morbidity and mortality rates7,9,10,12,13,15,16 (quality of evidence low, strong recommendation).

More recent technological advances and the development of endoluminal stents have led to changes in management strategies of several diseases, including colonic obstruction.9,12,13,15–17

The technical spectrum in the management of distal malignant colonic obstruction includes the following procedures.

**Proximal end or loop stoma.** The 3-stage management (proximal stoma, tumor resection, and stoma reversal) was originally proposed as a safe method to decrease mortality in acute obstruction. However, the advantages of stoma construction compared with primary resection were not confirmed in a Cochrane review in 200410 or in a randomized study by Kronborg.18 On the contrary, the use of a proximal stoma increased the hospital stay because of the need for multiple subsequent surgical procedures (quality of evidence high, strong recommendation).

In a retrospective analysis of 5,868 colostomies compared with 778 stents, the authors concluded that stent placement is less costly and associated with shorter length of hospital stay and fewer complications.19

At present, staged management is reserved for obstructions caused by mid or low rectal cancers before neoadjuvant treatment. It is also used for unresectable tumors or severely ill patients in the absence of colonic perforation. It is a surgical technique that can be performed in some cases with local anesthesia to resolve the obstruction and allow intensive resuscitation. In the second stage, colectomy can be performed9,12,13,15–17 (quality of evidence low, weak recommendation).

**Hartmann’s procedure.** This technique allows resection of the pathologic colonic segment without a primary anastomosis. It is the most frequently used in emergency surgery both in cases of obstruction and perforation secondary to left colonic lesions.17,20–22 Primary resection without anastomosis is a less complex procedure to perform in the emergency setting, avoids the morbidity associated with an anastomosis, and could be considered the procedure of choice in high-risk patients.17,20

Subsequent reconstruction of Hartmann’s procedure is performed in about 60% of patients. Many patients are never reversed, because of advanced age or comorbidities. The morbidity and mortality associated with colostomy reconstruction ranges from 5% to 57% and from 0% to 34%, respectively (quality of evidence low, weak recommendation).

**Resection and primary anastomosis.** This management combines the treatment of the disease and the intestinal reconstruction in a 1-stage procedure. The morbidity and mortality associated with colostomy and its subsequent reconstruction are avoided.

For many years, the construction of an anastomosis in the emergency treatment of left colonic complications was avoided because of the fear of a high rate of anastomotic leak.9,12,13,15–17,23 However, several recent studies have focused on risk factors for left colonic anastomotic leak.9,12,13,15–17,23

Main risk situations include malnutrition, chronic renal failure, and immunosuppression.8,17,24

Prognostic factors for mortality in colonic obstruction have been identified: preoperative renal failure, American Society of Anesthesiologists class 3 or 4, and proximal colon lesions. The presence of all these factors could influence the choice of surgical technique.8

### Table 1 (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Technique</th>
<th>Palliative patients</th>
<th>Number of patients (stent/surgery)</th>
<th>Outcomes</th>
</tr>
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<tbody>
<tr>
<td>Watt et al (2007)51</td>
<td>Stent vs others</td>
<td>Yes</td>
<td>1,125/660</td>
<td>Stenting appears to be safe and effective</td>
</tr>
<tr>
<td>Farrell (2007)</td>
<td>Stent</td>
<td>No</td>
<td>11/11</td>
<td>Same morbidity and mortality; stenting better operative time, oral intake, hospital stay</td>
</tr>
<tr>
<td>Fiori et al (2004)45</td>
<td>Stent vs colostomy</td>
<td>Only</td>
<td>11/11</td>
<td>Effective and safe in palliative patients; bridge to surgery avoid colostomy</td>
</tr>
<tr>
<td>Sebastian et al (2004)13</td>
<td>Stent</td>
<td>Yes</td>
<td>1,198</td>
<td>Stenting provides a better quality of life and appears to be cost-effective</td>
</tr>
<tr>
<td>Xinopoulos et al (2004)46</td>
<td>Stent vs colostomy</td>
<td>Only</td>
<td>15/15</td>
<td>Stent should be considered in incurable obstructing colorectal cancer patients</td>
</tr>
<tr>
<td>Law et al (2003) 12</td>
<td>Stent vs surgery</td>
<td>Yes</td>
<td>30/31</td>
<td>Bridge to surgery should be used in colorectal cancer obstruction</td>
</tr>
<tr>
<td>Saida et al (2003)62</td>
<td>Stent vs surgery</td>
<td>No</td>
<td>44</td>
<td>Colorectal stents offer good palliation; bridge to surgery is safe and effective</td>
</tr>
<tr>
<td>Khot et al (2002)62</td>
<td>Stent</td>
<td>Yes</td>
<td>598</td>
<td></td>
</tr>
</tbody>
</table>
In most studies, bowel preparation was considered of secondary importance, and the technical difficulties of the surgery and grade of peritonitis were more relevant factors. The different techniques of resection and primary anastomosis are as follows:

**Resection and primary anastomosis with colonic irrigation.** In 1988, an experimental randomized study performed by Ravo et al. concluded that if the intestinal content in contact with the anastomosis is removed, the anastomosis can be performed safely, even in the presence of peritonitis. Several methods have described for colonic preparation during emergency surgery. The most accepted are colonic irrigation and mechanical decompression. Both techniques are comparable and do not present significant differences with respect to mortality, leak, or infection rates. Segmental colectomy with anastomosis after

<table>
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<th>Study</th>
<th>Comparison</th>
<th>Number of patients</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gainant (2012)</td>
<td>None</td>
<td>—</td>
<td>Management must be adapted to site and stage tumor, patient’s condition, and experience of the treatment team</td>
</tr>
<tr>
<td>Kaser et al (2012)</td>
<td>Subtotal colectomy vs segmental colectomy</td>
<td>49</td>
<td>Subtotal colectomy lower anastomotic leak</td>
</tr>
<tr>
<td>Gash et al (2011)</td>
<td>Laparoscopic surgery in colonic obstruction</td>
<td>24</td>
<td>Feasible and safe</td>
</tr>
<tr>
<td>Frago et al (2011)</td>
<td>Proximal vs distal colonic obstruction</td>
<td>377</td>
<td>High mortality and morbidity</td>
</tr>
<tr>
<td>Biondo et al (2010)</td>
<td>Surgical specialization on emergency colectomy</td>
<td>1,046</td>
<td>Specialization in colorectal surgery better outcomes</td>
</tr>
<tr>
<td>Ansaloni et al (2010)</td>
<td>None</td>
<td>—</td>
<td>Poor scientific evidence</td>
</tr>
<tr>
<td>Kam et al (2009)</td>
<td>Irrigation vs manual decompression</td>
<td>449</td>
<td>Similar results</td>
</tr>
<tr>
<td>Ortiz et al (2009)</td>
<td>With vs without intraoperative colonic irrigation</td>
<td>102</td>
<td>Intraoperative colonic irrigation not necessary</td>
</tr>
<tr>
<td>Trompetas (2008)</td>
<td>None</td>
<td>—</td>
<td>Management of left-sided colonic obstruction remains a challenge</td>
</tr>
<tr>
<td>Breitenstein et al (2007)</td>
<td>None</td>
<td>—</td>
<td>1-stage surgery appears to be superior to others procedures</td>
</tr>
<tr>
<td>Finan et al (2007)</td>
<td>None</td>
<td>—</td>
<td>Consensus</td>
</tr>
<tr>
<td>Hennekine-Mucci et al (2006)</td>
<td>Subtotal colectomy vs total colectomy</td>
<td>72</td>
<td>Ileocolonic anastomosis is “safe”</td>
</tr>
<tr>
<td>Villar et al (2005)</td>
<td>Surgical options for left-sided colonic obstruction</td>
<td>63</td>
<td>Segmental coectomy with colonic irrigation most effective</td>
</tr>
<tr>
<td>Cuffy et al (2004)</td>
<td>None</td>
<td>—</td>
<td>Treatment depend of disease location, patient’s condition, age and nutritional status</td>
</tr>
<tr>
<td>De Salvo et al (2004)</td>
<td>Primary vs staged resection</td>
<td>—</td>
<td>The trials do not allow a reliable assessment</td>
</tr>
<tr>
<td>Meyer et al (2004)</td>
<td>Value of Hartmann’s procedure</td>
<td>213 emergency/422</td>
<td>Hartmann’s procedure in emergency cases</td>
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<tr>
<td>Naraynsingh et al (1999)</td>
<td>Primary anastomosis without colonic lavage</td>
<td>58</td>
<td>Can be carried out safely after decompression alone</td>
</tr>
<tr>
<td>Torralba et al (1998)</td>
<td>Subtotal colectomy vs intraoperative colonic irrigation</td>
<td>66</td>
<td>Subtotal colectomy is the treatment of choice</td>
</tr>
<tr>
<td>Frager et al (1998)</td>
<td>Computed tomography and contrast enema</td>
<td>75</td>
<td>Computed tomography can be preferable to contrast enema</td>
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<tr>
<td>Biondo et al (1997)</td>
<td>Intraoperative colonic lavage and primary anastomosis</td>
<td>212</td>
<td>Operation of choice for selected patients</td>
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<tr>
<td>Kronborg (1995)</td>
<td>1-stage vs 2-stage treatment</td>
<td>121</td>
<td>Similar overall recurrence rates</td>
</tr>
<tr>
<td>The SCOTIA Study Group (1995)</td>
<td>Subtotal colectomy vs segmental colectomy</td>
<td>91</td>
<td>Subtotal colectomy in cecal perforation or synchronous neoplasms</td>
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</table>
intraoperative colonic irrigation is the most effective operative treatment for neoplastic left-sided colonic obstructions.\(^3\) It could be considered the technique of choice in selected patients without risk factors.

In a 2004 systematic review, Trompetas\(^17\) concluded that there is no evidence to state that mechanical bowel preparation is associated with a decrease anastomotic leak rate after colorectal surgery. Ortiz et al\(^29\) concluded that resection and primary Anastomosis can be safely performed without intraoperative irrigation (quality of evidence moderate, strong recommendation).

**Subtotal colectomy with ileosigmoid or ileorectal anastomosis.** A subtotal colectomy allows resection with primary anastomosis performing an ileocolic anastomosis instead of a colocolic anastomosis. Prior studies have shown that an ileocolic anastomosis has a lower leak rate than a colocolic anastomosis, <10% compared with 18% to 20%,\(^33\) in patients with colonic obstruction. Other advantages of subtotal colectomy compared with segmental resection and primary anastomosis are the removal of a nonprepared, distended colon that can harbor ischemic lesions or synchronous tumors not detected during surgery.

Although many groups routinely use this surgical procedure for the emergency treatment of distal colonic obstruction, other authors favor segmental resection because of better functional (fewer bowel movements) and quality-of-life results compared with subtotal colectomy, with morbidity and mortality of 7% and 2%, respectively.\(^17,33–35\) It has been claimed that long-term functional dysfunction can be controlled with medication.\(^36\)

In case of cecal perforation or ischemia and if synchronous neoplasms are present in the colon, this management is recommended\(^34\) (quality of evidence high, strong recommendation).

**Resection and primary anastomosis with proximal diverting stoma.** The use of a loop ileostomy or colostomy to defunction or “protect” a distal anastomosis has been considered an alternative to Hartmann’s procedure. This procedure could increase the probability of stoma closure. A reduction in the incidence of anastomotic leaks has not been proved, and the colon must be cleaned of its fecal content to decrease the severity of the leak\(^37\) (quality of evidence very low, weak recommendation).

**Surgical approach: open or laparoscopic.** Obstruction has classically been considered an exclusion criterion for laparoscopic surgery. Progressive implantation and experience of colorectal surgeons in minimally invasive surgery, as well as the development of new instruments, have made it possible for some groups to perform resective laparoscopic surgery for colonic obstruction, although with a low grade of recommendation\(^38\) (quality of evidence very low, weak recommendation).

**Endoluminal stenting.** Since the first description of the treatment of colonic obstruction using stents in palliative patients with colorectal cancer,\(^39\) the indications for colonic stents have increased.\(^40\) It is used as a permanent palliation in patients with unresectable disease and also as a first treatment of colonic obstruction in patients in whom resection will be performed in a second stage considering the stent as a “bridge to surgery.”\(^40\)

Results are variable in the different studies evaluated.\(^41\) Although early studies showed high technical success rates (92% to 93.3%) as well as alleviation of symptoms (88% to 88.6%)\(^12,43\) compared with surgery, there was a significantly higher rate of resolution of the obstruction in surgery groups compared with the stent groups (98.8% vs 78%).\(^24\) The definition of success was not the same in the different studies. There were no significant differences with respect to 30-day mortality, which was 2.3%.

Differences in postprocedural morbidity, 39.2% in the stent group and 45.7% in the surgery group, were not significant. Although the stent group had shorter hospital stays, operative time and blood loss were similar to those in the surgery group.\(^44\)

**Palliative patients**

Three randomized prospective studies compared the use of stents versus surgery in palliative patients with obstructing colorectal cancer.\(^45–47\)

Fiori et al\(^45\) included patients with metastatic disease and patients with locally unresectable tumors without complete obstruction. The authors concluded that self-expanding stents are the treatment of choice in patients with unresectable colorectal cancer with stenosis, with shorter hospital stays and earlier tolerance of an oral diet than in patients in whom stomas were performed.

Xinopoulos et al\(^46\) concluded that stents are a palliative alternative to colostomy for patients with inoperable malignant colorectal strictures (metastatic disease, hemodynamic and/or pulmonary instability) and that stents provide better quality of life for patients, without the psychological consequences of a colostomy. Unfortunately, it is not clear how the authors reached this conclusion, because randomization criteria, sample size, and quality-of-life assessment used were not described in their report.

A randomized clinical trial performed by van Hooft et al\(^47\) in patients with stage IV colorectal cancer with unresectable metastatic disease and risk for obstruction was terminated early because of the high rate of complications in the stent group. Colonic stents were successfully placed in 9 patients, while 6 patients had perforations. Other authors have also described a high rate of complications in stented patients.\(^46\)

Survival in palliative patients who have stents placed has been compared with that after surgery.\(^49\) Different studies have shown shorter hospital stays, lower rates of stoma creation,\(^50–52\) and an earlier start of chemotherapy in the stent group in patients with unresectable metastatic disease.\(^50\)

However, in the study of Lee et al\(^50\) and in others,\(^53\) resection of the primary tumor was associated with a better prognosis compared with the stent group. A mean survival rate of 15.9 to 23.7 months was observed in the resection group compared with 4.4 to 7.6 months in the stent group.
In general, the design of the different studies on patients with unresectable metastatic disease presents a low level of evidence; there is a high lack of homogeneity in patient inclusion and treatments. Perhaps in palliative patients with limited overall survival, stenting could be an alternative (quality of evidence low, strong recommendation).

**Bridge to surgery**

With regard to the use of stents as a bridge to surgery, when the results of the 6 existing randomized studies were analyzed, different questions raised concerning the design of the studies and their interpretation. Moreover, to draw overall conclusions from these studies is difficult, especially given that 3 of them were not concluded.

Cheung et al examined whether the use of stents would allow a second-stage laparoscopic resection and primary anastomosis without stoma. All patients in their study were operated on by the same surgical team, and a 67% success rate was observed for 1-stage surgery. It can be noted that these good results contrast with the large number of Hartmann’s procedures performed, almost one third of patients in both groups. The rate of primary anastomosis was lower than that published by groups that perform resection and primary anastomosis in selected patients in emergency surgery (~80%), with an anastomotic leak rate of 7.7%.

A study by Pirlet et al was designed to test the hypothesis that stent placement as a first step before resective surgery would decrease the need for a stoma and would decrease morbidity and mortality compared with emergency surgery. Resolution of the obstruction in patients with stent placement was achieved in only 40%, with a morbidity rate of 50% in this group of patients. The stoma rate was 43% in the stent group and 57% in the surgery group. Although all patients in whom resection and anastomosis were performed after stent placement had favorable postoperative courses, the elevated rate of nonresolution of the obstruction in the stent group resulted in early interruption of the study.

In a study by van Hooff et al, the primary outcome (not achieved) was mean global health status. No differences in morbidity, mortality, and general health status were observed between the groups. There were significant differences in the rate of stoma formation, which was higher in the emergency surgery group, although the anastomotic leak rate was 5 times higher in the stent group compared with the emergency surgery group. The study was interrupted when a high absolute and relative risk for morbidity was observed in the stent group in interim analysis.

A study by Alcántara et al was designed with the hypothesis that both strategies would present the same results for hospital stay, security, and costs. The strong conclusions of the study were based on 28 randomized patients. The trial was concluded in advance when a higher anastomotic leak rate was observed in the emergency surgery group (30.7% in the surgery group vs 0% in the stent group followed by elective surgery). Such a high rate of anastomotic leakage, not comparable with results in the literature for this situation, could be related to the lack of patient selection and to the fact that patients were operated on by several surgeons not specifically dedicated to colorectal surgery. Patients in the stent group were operated on by a reduced number of specialized surgeons. The cost analysis also showed that emergency surgery was more expensive. However, in this study the authors used the Retrowash system in emergency surgery, which increased costs, and it is not commonly used by other surgical groups.

Ho et al designed their trial to show a 40% decrease in morbidity in the stent group compared with the emergency surgery group. The clinical success rate of stent placement was slightly higher than 50%, and the stoma rate was lower in this group. Morbidity rates were lower in the stent group, but only in urinary tract and abdominal wall infections, not in major complications requiring surgical revision. The percentage of major complications was similar in both groups, 10% in the stent group and 11% in the emergency surgery group.

A clinical trial by Ghazal et al compared endoscopic stenting followed by elective colectomy (left hemicolectomy or anterior resection) with total colectomy with ileorectal anastomosis in emergency setting. In that study, the type of surgery performed in the 2 treatments was not comparable, and the surgical results are debatable.

With regard to survival, it seems that there are no adverse oncologic consequences in patients in whom stents are placed as a bridge to surgery, or compared with emergency surgery, although lymphatic invasion was more common in the bridge-to-surgery patients.

When stented patients were compared with elective (non-obstructing) colorectal cancer patients, no differences in 5-year survival were observed (60% vs 58%, respectively), although there were fewer patients in the stent group. Other prior publications have reported negative results regarding survival, and a more recent study, a comparative study with a propensity score analysis, questioned the oncologic safety in patients receiving stents, suggesting that overall survival of patients with left malignant colon obstruction treated by stent insertion is worse compared with immediate surgery.

**Systematic reviews and meta-analysis**

The results of systematic reviews and meta-analysis published in these years are not homogeneous. With respect to primary anastomosis, Cennamo et al found that primary anastomosis was performed in 65.2% of patients in the stent group versus 46.8% in the surgery group. Zhang et al concluded that the use of self-expanding metallic stents could decrease the need for stoma formation and complications in general, observing a significantly lower rate of complications in the stent group compared with the emergency surgery group, although the authors note the heterogeneity of their results. However, a meta-analysis conducted by Tan et al concluded that although the rate of stoma formation...
was significantly lower in the stent group, there were no differences between the groups when permanent stomas were studied. No significant differences were observed in postoperative mortality between groups or in postoperative complications, including anastomotic leak. Different results are reported in a systematic review and meta-analysis performed by Ye et al.71

Recently, a new systematic review and meta-analysis has been published including only multicenter RCTs.72 The clinical success rate for resolution of the obstruction was 52.5% in the stent group compared with 99% in the emergency surgery group. Thirty-day postoperative morbidity and mortality were 48.4% and 8.2% in the stent group and 51.0% and 9.0% in the emergency surgery group. Surprisingly, primary anastomosis was performed in only 64.9% of patients in the stent group, compared with 55.0% in the emergency surgery group, with anastomotic leak rates of 9.0% and 3.7% respectively, without significant differences.

A systematic review performed by Watt et al51 in 2007 concluded that the safety and efficacy of the use of stents for malignant colonic obstruction compared with surgery could not be determined by the existing evidence.

Comments

In the past decade, both the diagnosis and treatment of obstructing colorectal cancer have changed.

At present, abdominal computed tomography with intravenous and rectal contrast is the most useful diagnostic tool in patients with clinical symptoms of colonic obstruction,11,12 not only for its advantages over other techniques but also because it has become available in most emergency departments. Hydrosoluble contrast enema has now become a diagnostic test of the past. Few emergency departments are equipped with readily available colonoscopy. It can be considered that it is used more in the field of treatment than of diagnosis, and it could be used for stent placement or for patients with equivocal diagnoses.

Right colectomy has been established as the treatment of choice for right-sided colon cancers in both the elective and emergency settings. It has been considered a safe technique that allows 1-stage resection and anastomosis.73 The evidence and recommendation for its use are based on everyday clinical practice in surgical departments around the world. There has hardly been any debate on this technique, although it should be questioned if a primary anastomosis is safe in all patients, the same as in distal colonic obstruction. There are only isolated reports from several surgical groups describing the use of a diverting proximal stoma in high-risk patients.7,8

The evolution of the treatment of distal colonic obstruction has been more controversial. In the past 3 decades, a few bold surgeons insisted on demonstrating that it is possible to treat the obstruction by resection and 1-stage primary anastomosis in selected patients.31,34,74–76 However, after performing a comprehensive review of the literature, we have found that most groups continue to use a 2-stage treatment approach in the emergency setting, either a Hartmann’s procedure or stent placement and subsequent “elective” surgery.

To understand this last point, there are perhaps 2 questions for debate. On one hand, the recent trend toward surgical subspecialization aims to improve medical results.21,77 This has been the subject of several studies demonstrating that
emergency colonic surgery has better results when performed by specialized colorectal surgeons.

Endoluminal stents have been found to resolve a high percentage of distal colonic obstructions, although the results with respect to morbidity, mortality, need for stomas, or primary anastomosis in the different RCTs, systematic reviews, and meta-analysis are confusing and nonhomogenous. As an example, the meta-analysis of Ye et al.71 gives the highest score according to Jadad’s classification78 (where 1 of the 5 possible points for classification is related to the blinding method) to the RCTs of stent placement despite not being able to perform double blinding. Moreover, some of these RCTs had methodologic flaws and were based on very small numbers of patients.

The use of stents seems to offer only occasional advantages with respect to staging of the cancer, because the initial diagnosis is usually performed by computed tomography. Stenting is also not useful for obtaining biopsies, because stents are not always placed by colonoscopy.

The differences in the anastomotic leak rate, morbidity, mortality, and oncolgic results between elective surgeries after stent placement performed by a colorectal surgeon compared with emergency surgery performed by a general surgeon observed in some RCTs could perhaps justify their use, although a subsequent laparoscopic approach is not feasible in all cases. Thus, the debate probably should not be if a stent should be used or not, or if emergency surgery is better or worse than stent placement, but rather when the patient will benefit from the use of a stent.

Our recommendation on the basis of the existing literature would be to consider the use of a stent when a colorectal surgeon is not available and/or the patient is at high risk for postoperative morbidity and mortality or in the presence of very low prognostic survival (Fig. 2). Table 3 shows the key points that can be drawn from the present systematic review.

Conclusions

In view of the different alternatives and of the lack of high-quality evidence, the treatment of distal colonic obstruction should be individually tailored to each patient. Diverting ileostomy could be added in high risk patients if primary anastomosis is performed both in proximal and distal obstruction. In distal colon obstruction, stenting can be a valid option in high-risk patients with poor postoperative survival. It could be also used as a “bridge to surgery” depending on the surgeon’s experience in colorectal surgery. There is insufficient evidence to determine if the endoluminal manipulation of the tumor will result in worse oncolgic outcomes.

References


Table 3  Keys points

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57. Alcántara M, Serra-Aracil X, Falco J, et al. Prospective, controlled, randomized study of intraoperative colonic lavage versus stent...