Perforation in colorectal stenting: a meta-analysis and a search for risk factors CME

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Background: Recent studies suggest that there is a substantial risk of perforation after colorectal stent placement.

Objective: To identify risk factors for perforation from colonic stenting.

Design: A meta-analysis of 86 studies published between 2005 and 2011.

Setting: Multicenter review.

Patients: All patients who underwent colorectal stent placement.

Intervention: Colorectal stent placement.

Main Outcome Measurements: The occurrence of perforation with subgroup analyses for stent design, stricture etiology, stricture dilation, and concomitant chemotherapy, including the use of bevacizumab.

Results: A total of 4086 patients underwent colorectal stent placement; perforation occurred in 207. Meta-analysis revealed an overall perforation rate of 7.4%. Of the 9 most frequently used stent types, the WallFlex, the Comvi, and the Niti-S D-type had a higher perforation rate (>10%). A lower perforation rate (<5%) was found for the Hanarostent and the Niti-S covered stent. Stenting benign strictures was associated with a significantly increased perforation rate of 18.4% compared with 7.5% for malignant strictures. Dilation did not increase the risk of perforation: 8.5% versus 8.5% without dilation. The subgroup of post-stent placement dilation had a significantly increased perforation risk of 20.4%. With a perforation rate of 12.5%, bevacizumab-based therapy was identified as a risk factor for perforation, whereas the risk for chemotherapy without bevacizumab was 7.0% and not increased compared with the group without concomitant therapies during stent therapy (9.0%).

Limitations: Heterogeneity; a considerable proportion of data is unavailable for subgroup analysis.

Conclusions: The perforation rate of colonic stenting is 7.4%. Stent design, benign etiology, and bevacizumab were identified as risk factors for perforation. Intraprocedural stricture dilation and concomitant chemotherapy were not associated with an increased risk of perforation. (Gastrointest Endosc 2014;79:970-82.)

Abbreviations: CI, confidence interval; SEMS, self-expandable metal stent.

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The use of self-expandable metal stents (SEMSs) for colorectal obstruction has evolved over the past decades. Their applications have extended to the management of acute malignant colorectal obstruction, palliation of inoperable obstructing colorectal cancer, and treatment of benign colonic strictures.[1,2] In the setting of emergency acute colorectal obstruction, colorectal SEMS placement has several advantages over surgery. SEMS placement allows (1) the possibility to improve the patient's clinical condition to allow for elective surgery (also referred to as a bridge to surgery) and (2) accurate tumor staging to prevent surgery in patients with incurable disease or those with an unacceptable surgical risk.[3] The potential benefits reported after SEMS placement are decreased mortality, morbidity, number of temporary and permanent colostomies, and hospital stay. These benefits are supported by several uncontrolled and comparative studies.[4-12] However, some recently published randomized, controlled trials failed to confirm advantages of SEMS placement over surgery for patients with malignant colonic obstruction.[13-16]

Clinical failure after successful colorectal SEMS placement is mainly caused by stent occlusion (16%), stent migration (uncovered SEMSs, 3%-12%; covered SEMSs, 30%-50%), and perforation of the tumor and/or normal colonic wall.[17] The latter is the most feared adverse event of colonic stenting because of its serious consequences. According to current literature, perforation occurs in 3.8% to 6.9% of the patients undergoing colonic stent placement,[18-20] requires surgical management in the majority of patients (73%), and leads to death in 16.3% of cases.[21] Despite the severity of this adverse event, details on perforation are poorly reported in literature. Therefore, little is known about the etiology of colonic perforation in patients undergoing colonic stent placement. Van Hooft et al[13] prematurely closed their randomized study because of an unexpected high perforation rate in the SEMS group compared with the surgical group and suggested that the type of stent and administration of chemotherapy could have played a causative role. Cennamo et al[22] reported an increased risk of colonic perforation during bevacizumab-based therapy. Studies are lacking to definitively confirm the risk factors for colonic perforation after SEMS placement. Therefore, the primary objective of our study was to extensively review the published data and to assess the effects of different types of colorectal stents on the occurrence of colonic perforation in patients undergoing colorectal SEMS placement for malignant and benign colorectal obstruction. Secondary objectives were to assess the effects of chemotherapy, particularly bevacizumab administration, stricture dilation, and the etiology of stenosis on the occurrence of perforation.

Take-home Message

- The perforation risk in colorectal stenting is 7.4%; almost 70% of perforations occur in the first week after stent placement.
- This meta-analysis suggests that certain factors influence the risk of perforation, such as the type of stent, a benign stricture etiology, and concomitant bevacizumab therapy.

METHODS

This study was designed as a literature review with additional retrospective data collection and a meta-analysis. On March 7, 2011, the MEDLINE database was searched beginning with data published from January 2005 forward. Only publications in English were reviewed. To avoid missing relevant citations, reference lists of reviews on colonic stenting were also checked. Figure 1 shows the selection criteria and the results of the search process. The search and selection process was conducted by the first author under the direct supervision of 2 other authors (A.R., J.v.H.). The reviewers had no affiliation with other authors, institutions, or journals of the articles ultimately included in the analysis. After fulfillment of inclusion criteria, we identified 4 duplicate publications that were excluded.[23-26] The study by Kim et al[27] included 55 patients from the study by Song et al.[28] However, both studies were included because they described large study populations and reported different cases of perforations.

A total of 86 studies met eligibility criteria and were included in this review. The study designs were retrospective (n = 46, 53.5%); prospective (n = 22, 25.6%); case report (n = 7, 8.1%); randomized, controlled trials (n = 5, 5.8%); both retrospective and prospective (n = 2, 2.3%); and undefined (n = 4, 4.7%). Malignant lesions were the primary stenting indication in 77 studies (89.5%), whereas 9 (10.5%) focused on benign colonic stenting. Stents were inserted endoscopically under fluoroscopic guidance in 62 studies (72.1%), purely radiologically in 8 studies (9.3%), and purely endoscopically in 2 studies (2.3%); combinations were used in 11 studies (12.8%), and the technique for stent deployment was not reported in 3 studies (3.5%). Study characteristics are presented in Table 1 (available online at www.giejournal.org). Data extracted regarding the total study population and the specific cases of perforation are depicted in Table 2. As previously mentioned, details on perforation are poorly reported in literature. When the required data (Table 2) were missing from publications, the corresponding authors were contacted by e-mail to request these data. The data provided in the literature were sufficient for inclusion in our review in only 8 articles, including 6 case reports. Therefore, request letters for additional data were sent to the corresponding authors of the 78 remaining studies. When authors were queried about the site of perforation pertaining to the stent, they could choose one of the following options: proximal end of the stent, stent body, distal end of the stent, both ends of the stent, at the site