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## Stents for the Gastrointestinal Tract and Nutritional Implications



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**Endoscopic stenting of many sites along the gastrointestinal tract is used successfully for palliation of malignant or benign obstructions. These obstructions may be the result of primary gastrointestinal tumors invading the lumen, tumors of another primary site causing external compression or in some instance benign diseases secondary to various inflammatory processes. Stenting of the gastrointestinal tract has been commonly performed either by interventional radiologists with the use of fluoroscopy, or by gastroenterologists endoscopically, with or without fluoroscopic guidance. Their efficacy can be measured by resolution of obstruction or symptom improvement. The current literature shows that endoscopic stenting have acceptable success and complication rates and might be considered as first-line therapy in centers offering expertise in interventional endoscopy. The techniques, efficacy and complication of stenting will be discussed. Nutritional guidelines will also be provided based on our institutions practice.**

### INTRODUCTION

**E**ndoscopy within the last two decades has encompassed many interventional procedures allowing the treatment of multiple conditions of the upper and lower GI tract such as upper and lower GI bleeds (1) precancerous lesion removal (2), and foreign body extractions (3). Its role as a tool for stent placement in obstructive disease as well as strictures related to malignancy, or benign etiologies, has been confirmed in the

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most current literature (Table 1) (4–9). Common causes of stent requirement to preserve nutritional status include esophageal, duodenal, biliary and colonic obstruction; most of those conditions are related to primary (10) or secondary malignancies (11). Alternatives to endoscopy with stenting include radiologic intervention under fluoroscopy guidance, mainly used in esophageal or biliary decompression (12–14) and surgical intervention (15). Radiologic intervention and in particular, percutaneous transhepatic cholangiography with subsequent percutaneous or endoscopic drainage has a morbidity of up to 32% (12–14). Surgery is asso-

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**Table 1**  
**Indications for Gastrointestinal Stents**

1. Esophageal stents can decrease aspiration events and improve comfort.
2. Biliary stents can decrease pruritis, cholangitis and malabsorption.
3. Gastric and enteral stenting can relieve obstructive symptoms and improve the ability to eat.
4. Colorectal stenting can decrease the likelihood of a colostomy, and improve clinical conditions so that a patient may undergo surgery if resectable.
5. Colonic obstructions can also be palliated efficiently.

ciated with increased cost and lower quality life than endoscopic stenting (16–18).

## ESOPHAGEAL STENTS

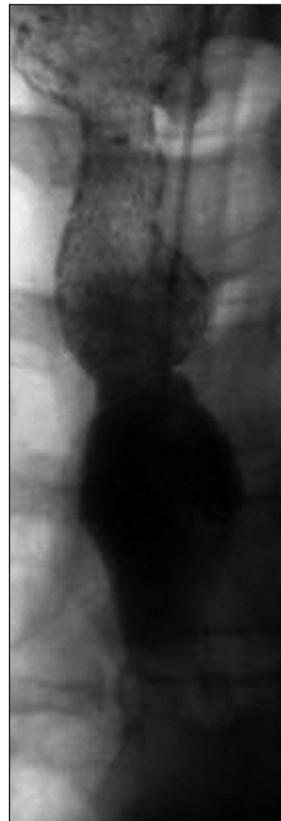
Esophageal cancer is often diagnosed at an advanced stage, and five-year survival rates are less than 20% (19). Dysphagia is a common symptom of advanced esophageal cancer, and can be difficult to manage. When the patient is no longer an operative candidate, cannot tolerate chemotherapy or radiation therapy, stenting becomes an excellent means of palliation by providing the patient immediate relief of symptoms in up to 95% of patients (20).

The safety of esophageal stenting has improved with the advent of self expandable metal stents (SEMS) in the 1990's (21). Prior to that, plastic stenting was the only option. The plastic stent is of a fixed diameter, and often, the lumen of the esophagus required dilation prior to stent placement. The SEMS can be inserted into a more narrow opening, and expand on their own over time, making dilation unnecessary, and reducing the risk of perforation, migration or obstruction which occurred with plastic stents (22). Stenting is also used in the management of tracheoesophageal fistulas (23), in the setting of advanced esophageal cancer, or invasive lung cancer. Stenting in this instance can be used as the primary treatment option; covered esophageal stents are effective in 85% of patients with tracheoesophageal fistula (24).

There is a higher initial cost for SEMS, but when compared to hospital time and the need for revisions,

metal stents proves to be more cost efficient (25) by better improving dysphagia, and inducing longer weight maintenance than plastic stents (26). In benign diseases, a self expandable plastic stent has recently been shown to be efficacious (9,27). Other stents (Figure 1) have been described in the literature, but their efficacy still remains to be determined (28).

Disadvantages of esophageal stenting initially include perforation, bleeding, malposition, tracheal compression and intractable reflux (if they involve the gastroesophageal junction) (29). Stent migration, tumor ingrowth, fistulization and hemorrhage associated with stent erosion are complications that may arise later (30,31).



**Figure 1.** Benign esophageal stricture treated with a metal stent



**Figure 2.** Patient with non-resectable pancreatic cancer complicated by biliary and duodenal obstruction and treated by a metal stent inserted through a metal duodenal stent.

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**Table 2**  
**Nutrition Guidelines Following Esophageal Stent Placement**

**Why Do I Need This Diet**

After your stent placement, this diet is necessary to make foods easy to swallow. The texture of your food needs to be altered to a moist/soft consistency so foods will go down your esophagus with ease.

**General Guidelines**

- Chew all food thoroughly.
- Eat 5–6 small meals per day if needed.
- Eat slowly and take small bites.
- Sit upright while eating.
- Drink fluids in between meals if you feel “full” with meals.
- Remain in an upright position at least 30-60 minutes after eating.
- Foods should always be prepared so that they are **moist, soft, and easily swallowed**.
- If food ever feels “stuck” in your throat take a couple sips of Coca-Cola® (not Pepsi®)\* This *may* help dislodge food from your esophagus. You may want to repeat this throughout the day, especially before and after each meal.
- If you are having trouble maintaining your weight, you may need to drink nutritional supplements (see below) or home-made milkshakes as snacks/meal replacements. If you need ideas, ask to meet with the “GI” nutritionist.

**\*NOTE:** The only “evidence” for this practice are the following articles—we realize this is not the same, but it is what we currently use until better data is available.

1. Mohammed SH, Hededus V. Dislodgement of impacted oesophageal foreign bodies with carbonated beverages. *Clin Radiol* 1986;37:589-592.
2. Karanjia ND, Rees M. The use of Coca-Cola in the management of bolus obstruction in benign oesophageal stricture. *Ann Royal Coll Surg Eng* 1993;75:94-95.

<b>Food Group</b>	<b>Yes Foods</b>	<b>Avoid</b>
Milk and Dairy Products	Milk—all kinds Yogurt, custard, ice cream Soft or melted cheese Cottage cheese, cream cheese	Ice cream or yogurt with chunks of fruit or nuts
Meat and Meat Substitutes	Soft eggs Tofu Casseroles Moist Fish Strained baby meats (for easy preparation) All other meats must be bite-size or ground— <b>suggest adding a gravy or sauce.</b>	Dry poultry Peanut butter All tough red and white meats
Fruits	All juices All canned fruits Fresh fruits peeled—bananas Stewed dried fruits. Strained baby fruits	Fresh fruits with skins—plums, peaches, oranges, apricots Dried fruits

Table 2 (continued)

Food Group	Yes Foods	Avoid
Vegetables	Well-cooked soft or pureed Should be "fork-tender" Strained baby vegetables	Raw vegetables
Bread and Starchy Foods	Cooked cereal Mashed potatoes, sweet potatoes, yams Baked potato without skin Soft, moist rice Noodles, macaroni, spaghetti Dry cereals <b>softened</b> in milk Pancakes softened with syrup/butter Waffles softened with syrup/butter Crackers or breads added to soups	Hard bread with thick crust Dry cereals without milk Potato chips Popcorn Crackers
Fats	Butter, margarine, mayonnaise Salad dressings Gravy Cream: sour, whipping, coffee	Bacon Nuts Deep fried, crispy food
Desserts	Sherbet, ice cream, Italian ice, frozen yogurts, Gelatin, puddings, mousse, custard All cake type desserts	Cookies Pie crust Any dry desserts Desserts containing nuts or skins
Commercial Nutritional Supplements**	Boost, Ensure, Kroger Fortify (Kroger brand), Equate (Walmart brand). Nutra-Shakes (1-800-654-3691). Carnation Instant Breakfast or equivalent brand (made with whole milk). To make a milkshake, try mixing these products with ice, ice cream, sherbet, or sorbet.	
Other	Sauces – cheese, white, barbeque, creamed, tomato Syrup, honey, jam, jelly Ketchup, mustard, relish	

\*\* Please see University of Virginia Health System Digestive Health website for more high calorie and protein liquid suggestions at: [www.healthsystem.virginia.edu/internet/digestive-health/nutrition.cfm#education](http://www.healthsystem.virginia.edu/internet/digestive-health/nutrition.cfm#education).

## ENTERAL AND BILIARY STENTS

Tumors involving or invading the gastric outlet or the small bowel can lead to obstructions, resulting in pain, poor nutritional status, dehydration and frequent hospitalization. This can be due to pancreatic cancer,

gastric cancers, carcinoid tumors, or metastases from other primary malignancies (32). Patients who are not surgical candidates can benefit from gastric or duodenal stenting to alleviate obstruction, providing there is no perforation or peritonitis. In case a biliary stent may

**Table 3**  
**Meals Ideals**

*Breakfast*

- Cereal softened with whole milk, canned fruit. Orange juice to drink.
- Scrambled eggs made with cheese and butter. Coffee to drink (creamer and sugar).
- Oatmeal made with whole milk, yogurt, and banana. Grape juice to drink.
- Pancakes or French toast with butter, syrup, or fruit sauce. Orange juice to drink.

*Lunch*

- Creamed or vegetable soup, applesauce with cinnamon and sugar. Ice tea to drink.
- Egg salad/tuna salad on soft, crust-less, buttered bread, melon. Lemonade to drink.
- Ground beef/pork with gravy, rice, and creamed corn or cooked/soft carrots. Milk to drink.
- Pasta or potato salad, soup or stew, canned/soft fruit. Water to drink.

*Dinner*

- Ground chicken with gravy, mashed potatoes with butter/cheese, soft green beans. Milk to drink.
- Macaroni and cheese, “bite-sized” hot dog with ketchup/mustard, baked beans. Ice tea to drink.
- Spaghetti with ground meat sauce, soft cooked vegetables with cheese sauce. Water to drink.
- Quiche or omelet made with cheese, spinach, or other cooked vegetables. Lemonade to drink.

**\*Try drinking sips of Coke if food feels stuck!**

be required or anticipated, it should be placed prior to the placement of a duodenal stent (Figure 2), since the duodenal stent will make biliary access endoscopically challenging (33). After enteral stent placement, the majority of patients can resume oral intake and seem to even tolerate chemotherapy (34).

Cholangiocarcinoma (35) and pancreatic cancers (36) often present in advanced stages and can lead to biliary obstruction associated with pruritis, cholangitis, fat malabsorption (from inadequate bile salt delivery to the lumen for micelle formation) and overall

failure to thrive (37). Biliary decompression can lead to improvement of symptoms and minimize complications due to infections. Either plastic or SEMS can be used in the management of biliary obstruction. Plastic stents are less expensive; however they often require replacement, as they may become occluded. SEMS are more expensive initially, but are less likely to require revision (38), resulting in lower overall cost with increased long term patency between 70% to 80 % (39). Disadvantages include bleeding, obstruction, perforation or malposition within the biliary tract, and pancreatitis. The recent addition of membrane covered biliary SEMS seems to increase long term patency (40) but at the price of increased migration potential (41).

In benign diseases of the biliary tree, such as stricture related to chronic pancreatitis or primary sclerosing cholangitis, plastic stents are still widely used as an alternative to surgery (42,43). It remains to be determined, if their patency can be improved to permit fewer sessions before achieving successful results (44,45).

**COLORECTAL STENTS**

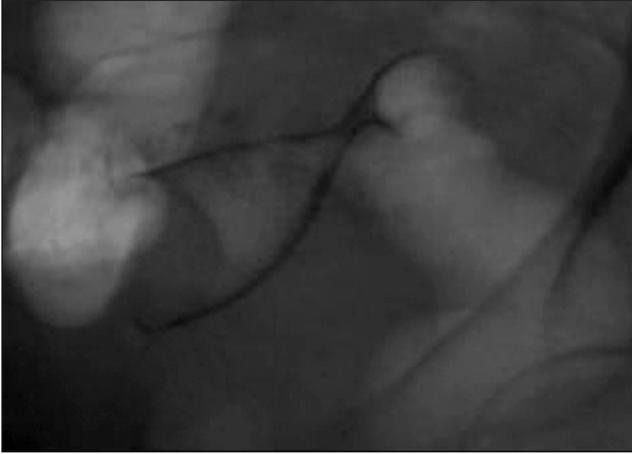
Colorectal cancer is the third leading cause of new cancer diagnoses within the United States in both men and women (46). Colorectal cancer often presents with symptoms of partial to complete obstruction (47). Stenting can be offered for palliation of a malignant obstruction (48) or prior to colorectal surgery (49), allowing for an adequate bowel preparation. This improves the patients’ clinical status, preparing them for a more optimal surgical outcome by decreasing the risk of infection and the need for a temporary colostomy (50). In non-surgical candidates, stenting can also provide adequate palliation of a colonic obstruction (Figure 3). Complications again include perforation resulting in peritonitis, bleeding and malposition (51).

**NUTRITION CONSIDERATIONS**

Before performing stent placement, the clinician should assess the nutritional status of the patient and the level of malnutrition. It is common practice in our institution to request a nutrition consult and discuss potential enteral access for temporary caloric support

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**Figure 3.** Patient with colon cancer palliated with a metal colonic stent.

before undergoing aggressive therapeutic intervention (once adequate nutritional repletion has been provided). In patients with pancreatic insufficiency due to pancreatic duct obstruction, pancreatic enzymes may be necessary with any oral intake or enteral feedings until the stent is placed. In those with biliary tree occlusions, a low-fat diet is beneficial until the flow of biliary secretions is resumed after stenting. In either of these circumstances, fat-soluble vitamin deficiency may become a concern depending on how longstanding the occlusion is.

It remains to be determined which diet is optimal in patients receiving stents; the literature unfortunately lacks any controlled trials in these patients. This represents an area of interesting future clinical research projects. For now, see Table 2 and 3 for one institution's esophageal stent diet suggestions.

### SUMMARY

Endoscopic stenting of a variety of locations along the gastrointestinal tract can palliate advanced stage cancers, and improve overall quality of life. Relief of dysphagia in patients with esophageal cancer can improve discomfort, nutritional and functional status. In experienced hands, endoscopic stenting is achieved readily and is associated with a low-rate of complications. Long-term failure is primarily a result of tumor extension or prosthesis failure. Investigation aimed at

improving the long-term patency of available stents and identifying optimal nutrition intervention is needed. ■

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