

Endoluminal stent placement core curriculum

This is one of a series of documents prepared by the American Society for Gastrointestinal Endoscopy (ASGE) Training Committee. This curriculum document contains recommendations for training, intended for use by endoscopy training directors, endoscopists involved in teaching endoscopy, and for trainees in endoscopy. It was developed as an overview of techniques currently favored for the performance and training for enteral stents and to serve as a guide to published references, videotapes and other resources available to the trainer. By providing information to endoscopy trainers about the common practices used by experts in performing the technical aspects of the procedure, the ASGE intends to improve the teaching and performance of enteral stents placement.

INTRODUCTION/IMPORTANCE

Enteral stent technology and techniques have evolved rapidly over the past decade. Enteral stents play an important role in the management of patients with both benign and malignant GI tract obstruction and play a critical role given their ability to restore luminal patency in a nonoperative manner. Most gastroenterology trainees receive little, if any, formal training in enteral stent placement. They learn largely by observation and hands-on experience under the supervision of more experienced endoscopists.

Although similar in concept, esophageal, small-bowel, and colonic stents may differ in their specific indication, design, and deployment and potential risks and benefits. Trainees wishing to become proficient in enteral stent placement should be aware of these differences to maximize clinical success while minimizing complications.

GOALS OF TRAINING

The Trainee

Enteral stent deployment represents a set of advanced procedures requiring complex diagnostic and therapeutic expertise and skills to manage potential complications. Thus, training is generally offered to individuals during the last year of a 3-year fellowship program or during a fourth-year advanced endoscopy program. Trainees should be

proficient in upper and lower endoscopy and should have a basic understanding of the use and interpretation of fluoroscopy. Fluoroscopy may require institutional privileges. Interpretation of cross-sectional imaging and contrast studies is also essential for the appropriate selection of patients. Training should be directed to those trainees who intend to have a scope of activity to regularly use their skills in practice.

Faculty

The program should have at least 1 faculty member who is expert in the area of enteral stent placement and who is familiar with a variety of available stents. Lectures, books, DVDs, online material, endoscopy courses, and hands-on training using ex vivo specimens may be useful adjuncts to the trainees' clinical experience.

When possible, trainees should work with a multidisciplinary team including an expert endoscopist, interventional radiologist, oncologist, and surgeon to learn optimal management of palliation of malignant luminal obstructions.

Facilities

The hospital or clinical site should have a procedure room capable of performing both endoscopy and fluoroscopy simultaneously because both are commonly used in patients undergoing enteral stent placement. In many instances, however, esophageal stents may be placed with endoscopic guidance alone.

Endoscopic experience

The training program ideally should offer a range of esophageal, gastroduodenal, and colonic stents cases. Trainees should encounter both benign and malignant conditions in which enteral stenting is contemplated. Competency in enteral stent deployment may be assessed after a trainee has participated in at least several enteral stent procedures of each type (esophageal, gastroduodenal, colonic).

TRAINING PROCESS: ESOPHAGEAL STENT PLACEMENT

Overview

Dysphagia caused by esophageal obstruction can be secondary to benign or malignant intrinsic lesions of the esophagus or from extrinsic compression. Patients may have a fistula in the absence of luminal obstruction. Trainees should understand the role of esophageal stents for

both benign and malignant disease, and the various self-expandable metal stents (SEMSs) and self-expandable plastic stent available for use.

Preprocedure considerations

Patient selection. Before considering esophageal stent placement, trainees should understand the importance of evaluating patient fitness for upper endoscopy and the need for anesthesia-assisted sedation. Trainees should recognize that some patients may have advanced malignancies, malnutrition, multiple comorbidities, and possible respiratory compromise because of esophagorespiratory fistula. Patients with oropharyngeal dysphagia (such as from a previous stroke) or poor dentition may receive minimal palliative benefit from esophageal stents.¹

Impending airway compression. Proximal and mid-esophageal or respiratory cancers can cause partial compression of the trachea/main bronchus. With expansion of the esophageal stent, further compression of the airway can occur, with respiratory compromise. Trainees must understand the appropriate roles of chest CT scanning and pulmonary consultation for determining the need for elective bronchial stent placement in selected patients.

Preprocedure evaluation

Informed consent. Trainees should be well versed with the process of obtaining informed consent for stent placement. Trainees must be able to discuss in lay terms the risks of stent placement (including stent migration, perforation, bleeding, chest pain, dysphagia, food impaction, and the need for repeat interventions), the alternatives (surgery, radiation therapy, dilation, tumor ablation, and PEG, and/or percutaneous endoscopic jejunostomy placement) and the expected outcome of each option. Trainees also must communicate postprocedure instructions, including dietary modifications, medications and the need to keep the head of the bed elevated (if the gastroesophageal junction is traversed). Trainees should recognize when an endoprosthesis is being used for an off-label use and be able to define this parameter and the indications for the recommendation. When used for palliation of malignant disease, patients should understand that stent placement is intended as permanent.

Patient preparation. Trainees should understand the potential for retention of food or liquid in the obstructed esophagus, with consideration for keeping the patient off solid food for a period of at least 1 day before the procedure. Airway protection may be warranted, especially if the procedure is being performed with the patient in the supine position, which may offer better fluoroscopic visualization. Trainees should routinely review all relevant imaging studies before the procedure.

Procedure considerations

Stricture/fistula evaluation. Trainees need to become skilled at evaluating the lesion and its associated

stricture and/or fistula before placing an esophageal stent. This may be accomplished by radiology imaging studies, direct endoscopic evaluation, and fluoroscopic imaging. The use of a small-caliber endoscope may allow stricture traversal when standard-size instruments fail.

Esophageal stents. Many esophageal stent options are available. Stents vary in material, weave, configuration or shape, radial expansion force, delivery device, deployment mechanism length (7-15 cm) and postdeployment mid-body and cuff diameters (12-23 mm). Trainees should be familiar with the available esophageal stents and develop a reasonable knowledge of the stent characteristics including mechanical properties (shortening vs nonshortening), fully covered versus partially covered, radiopacity, radial force, delivery catheter and deployment mechanisms (eg, proximal vs distal release), recapturing/repositioning features, removability and special features such as antimigration struts, and antireflux valves. Knowledge of stent parameters should be used to select the optimal stent for the individual circumstances.

Stent deployment. Trainees are expected to develop competency in deploying esophageal stents in all locations with fluoroscopic and endoscopic guidance. During deployment, trainees need to understand the importance of close communication with their assistants and fluoroscopy operators. In some circumstances, the upper and lower ends of the stricture need to be marked. Under fluoroscopic guidance, one can inject radiopaque material at the upper and lower end of the stricture, apply endoscopic clips, or use external markers. Trainees should also learn techniques to place a stent in situations in which the lower end of the stricture cannot be marked (strictures that can only be traversed with a guidewire). This generally requires accurate stricture measurement, selection of a stent of appropriate length, and deployment under strict fluoroscopic and endoscopic control.

Once a stent is deployed, trainees should be able to evaluate whether the stent is positioned correctly. Trainees should understand that it is not essential to pass an endoscope through the stent because this may result in unintended stent dislodgment. Trainees should also develop competency in repositioning or removing the stent or placing additional overlapping stents if the postdeployment position is unsatisfactory.

Postprocedure considerations

Trainees should be well aware of immediate, early, and late complications of esophageal stents and learn the interventions required to address these complications.¹ These reinterventions include repositioning/removing stents, recovering migrated stents, placing additional stents in patients with previously placed stents, and addressing epithelial hyperplasia, tumor overgrowth, and tumor ingrowth of a previously placed stent.

Immediate complications. Immediate complications of esophageal stent placement include bleeding, perfora-

tion, pain, nausea, and vomiting. Rarely, airway compression or compromise can occur. Trainees should be able to recognize complications that arise immediately after stent deployment and before discharge from the endoscopy unit. Endoscopy and postprocedure imaging studies may be required to fully assess patients before discharge.

Delayed complications. Trainees should be able to interpret properly patient symptoms and concerns and to investigate them with appropriate imaging and endoscopic studies. They should be able to formulate a treatment plan in the event of a delayed complication, such as tumor overgrowth and/or ingrowth and stent migration.

Follow-up. Trainees should have an understanding of the postprocedure care of patients after esophageal stent placement, including pain management and strict, long-term antireflux measures for those with stents bridging the GE junction. Trainees should be aware of symptoms and signs suggesting stent-related complications that may occur weeks or months after the procedure. Trainees should be able to consider the circumstances in which post-stent placement contrast or plain film radiography is indicated. Trainees should be able to discuss dietary recommendations and restrictions for patients after stent placement.

TRAINING PROCESS: SMALL-BOWEL STENT PLACEMENT

Overview

The placement of gastroduodenal stents is indicated for palliation of malignant gastric outlet obstruction (GOO). Enteral stent placement offers a minimally invasive alternative to surgical gastrojejunostomy and decompression in relieving GOO-related symptoms of nausea and vomiting and yields improvements in oral intake and quality of life.²⁻⁴

Preprocedure

Patient selection. Trainees should be able to evaluate a patient for associated peritoneal carcinomatosis and/or multifocal intestinal obstruction. Evaluation for necrotic tumor or preexisting tumor-associated perforation must also be undertaken because these patients may be at higher risk of primary stent failure and/or procedure-related complications, respectively. Trainees should understand the potential indication for prophylactic biliary stent placement in patients being considered for duodenal stent placement for obstructive pancreaticobiliary tumors.

Informed consent. Trainees should be well versed in the risks and complications of enteral stent placement as well as alternatives such as PEG/percutaneous endoscopic jejunostomy placement and surgical bypass. They should understand what are reasonable expectations for successful stent placement with regard to symptom relief, resumption of diet, and the types of food that the patient is likely to tolerate. Trainees should be able to communicate all of the above to patients and their family before and during the informed

consent process. Patients should understand that stent placement is intended as permanent.

Patient preparation. Patients with GOO may be at increased risk of aspiration events during sedation and endoscopy because of retained gastric contents. Trainees must recognize that preprocedure decompression of gastric contents via a nasogastric tube may be necessary. In addition, they should recognize that procedure sedation and airway management should be individualized, including the consideration for elective endotracheal intubation to facilitate the procedure. Finally, trainees should have an understanding of appropriate patient positioning during the procedure and be able to recognize the benefits and limitations of the supine, prone, and left lateral decubitus positions.

Enteral stents. Trainees are must learn the design and construction of enteral stents and the available sizes. Currently available enteral stents use a 10F through-the-scope (TTS) over-the-wire introducer system, requiring a therapeutic endoscope with a large working channel (ie, 3.7 mm). Therapeutic gastroscopes, colonoscopes, and duodenoscopes are all suitable for delivering enteral stents. Trainees should be proficient in using the various types of endoscopes and be able to recognize when 1 type of endoscope would be favored over another.

Finally, trainees are expected to gain proficiency in the use of various wires, catheters, and balloons that are used in the evaluation of strictures and deployment of stents.

Procedural considerations

Evaluation of stricture. Proper evaluation of GOO or small-bowel obstruction is critical before attempting small-bowel stent placement. Trainees must become proficient at determining stricture length. This may be done endoscopically (if the stricture may be traversed) or fluoroscopically using contrast injection or with contrast-filled balloons. Trainees should have an understanding that it is not necessary to traverse the obstructed region with an endoscope or to perform balloon dilation of the stricture before stent placement. Rather, it should be emphasized that the only prerequisite to enteral stent placement is the ability to advance a guidewire across the obstruction and to fluoroscopically define the extent of the stricture. Trainees must understand the issues regarding stent selection, including the selection of stent(s) of appropriate length sufficient to traverse the stricture but also to ensure that the proximal and distal stent ends are positioned so as to not be impacted into the bowel wall after deployment.

Stent deployment. Trainees are expected to develop proficiency in advancing an undeployed stent over the wire and across the stricture while maintaining endoscopic and fluoroscopic guidance. Emphasis should be placed on understanding the mechanism of stent deployment and the ability to recapture and reposition the stent should suboptimal positioning be encountered. Furthermore, trainees must learn that communication with the endoscopy assistant and

fluoroscopy operator is necessary for safe and successful stent placement.

Once an enteral SEMS has successfully been deployed, trainees should be able to assess the stent for satisfactory positioning and to evaluate for any complications. Trainees should understand that they do not need to traverse the deployed stent with the endoscope during this time to assess proper placement.

Immediate complications. Trainees are expected to be able to identify intraprocedural or immediate complications from enteral stent placement and use appropriate management strategies as needed. These include acute stent migration, bleeding, and perforation.

Delayed complications. Trainees should be taught to recognize and manage delayed stent-related adverse events including bleeding, perforation, stent migration, tumor ingrowth/overgrowth, and stent occlusion caused by benign tissue hyperplasia. Important endoscopic skills in this setting include the use of dilating balloons, ablation therapies (such as APC), and placement of additional stents.

TRAINING PROCESS: COLONIC STENT PLACEMENT

Overview

Colonic stent placement may be indicated in the management of malignant colonic obstruction. Colonic stent placement has been advocated to treat acute obstruction as a bridge to elective surgery in surgical candidates or as primary palliation for nonsurgical candidates. It may be performed for primary colorectal cancers or for obstruction caused by malignant extrinsic compression or metastases.

Preprocedure

Patient selection. Trainees should understand which patients are likely to benefit from colonic stent placement, with the most common indications being palliation and as a bridge to surgery. Trainees should be familiar with the relevant literature pertaining to the indications and anticipated outcomes of colonic stent placement and be able to apply that knowledge to the individual case at hand.

Informed consent. Trainees should explain to the patient what reasonable expectations are for successful stent placement with regard to symptom relief, passage of stool and gas, resumption of diet, types of food that the patient is likely to tolerate, and the need for any medications post-procedure. Trainees should be able to explain the risk of colonic stent placement to the patient.⁵⁻¹¹ They should be able to describe that perforation is a potential risk associated with colonic stent placement and that it could result in peritonitis, the need for emergency surgery and death. Low-lying rectal stents can potentially lead to tenesmus and, rarely, incontinence and should be discussed with patients with distal rectal obstruction. Trainees should also explain the alternatives to stent placement, such as colostomy with or without resection. Trainees are

expected to be able to communicate all of the above to the patient and family before and during the informed consent process.

Patient preparation. Trainees must recognize that patients with large-bowel obstruction represent a high-risk patient subset. Patients may have severe pain and/or respiratory compromise from limited diaphragmatic excursion caused by a tense abdomen. Patients with colonic obstruction are at risk of spontaneous perforation caused by high intracolonic pressures. Trainees should recognize the urgency to relieve the obstruction. Trainees should be able to individualize sedation and airway protection.

Colonic stents. Trainees are expected to learn about the sizes, designs, and deployment of available colonic stents. Currently available colonic stents use either a 10F TTS over-the-wire introducer system or non-TTS catheters that are placed in an over-the-wire manner under fluoroscopic guidance similar to that used with some esophageal stents. A therapeutic endoscope with a large working channel (ie, 3.7 mm) is required for placing TTS stents. Therapeutic gastroscopy and colonoscopy are both suitable endoscopic platforms for delivering colonic stents. Trainees should be proficient in selecting and using the appropriate types of endoscopes.

Finally, trainees are expected to gain proficiency in the use of various wires and catheters that are used in the evaluation of strictures and deployment of stents.

Procedural considerations

Evaluation of stricture. Trainees must be able to perform proper evaluation of large-bowel obstruction before attempting colonic stent placement. This includes review of appropriate imaging studies, such as CT scans, to evaluate the level of bowel obstruction and to exclude perforation (a contraindication to stent placement).

Determination of stricture length can be accomplished by a variety of means and similar to that used in esophageal and enteral stents. Routine balloon dilation of malignant large bowel stenoses is not advocated, although it may be considered in individualized circumstances. External markings and/or intraluminal markers such as submucosal contrast injection or endoluminal clips are less commonly used for the placement of colonic stents. Insufflation should be minimized and preferentially use CO₂ rather than standard air.

The location of the stricture, traversability, and angulations are all factors that trainees must learn to assess in selecting the appropriate patient, endoscope, and stent.

Stent deployment. Trainees in colonic stent placement are expected to develop proficiency in advancing an undeployed stent over a guidewire and across the stricture. As with all stents, trainees should learn that communication with the endoscopic assistant and fluoroscopy operator is critical for safe and successful stent deployment.

After a colonic SEMS has successfully been deployed, trainees must be able to assess the stent both endoscopy-

cally and fluoroscopically to ensure that it is positioned correctly to allow colonic decompression and to evaluate for any complications.

Immediate complications. Trainees must be able to identify and manage complications from colonic stent placement, most commonly bleeding and perforation. These events can occur from overinsufflation of air, manipulation of the wire, passage of the undeployed stent, expansion of the stent, or from the endoscope itself. Acute stent migration can occur but is rare. If abdominal distention or pain persists or increases, perforation, stent migration and/or malposition, or incomplete expansion should be suspected and prompt abdominal x-rays should be obtained. Trainees are expected to be able to recognize these adverse events and use appropriate management strategies as needed.

Most patients experience rapid clinical improvement via the passage of gas and liquid stool after colonic stent deployment. Trainees should be able to evaluate the patient for signs of complications both immediately after deployment and before discharge from the endoscopy suite/recovery room and provide instruction about how to watch for signs or symptoms of complications to the patient or caregivers.

Delayed complications. Recurrent obstruction caused by tumor ingrowth/overgrowth, migration, or tissue hyperplasia can occur in a delayed manner, as can perforation. The use of chemotherapy, in particular bevacizumab, after stent placement is associated with perforation rates as high as 15%, usually manifesting as a delayed perforation.¹² Trainees must be able to discuss these issues with the patient and treating oncologist. Trainees should be able to describe appropriate post-stent management to maintain soft stools with use of stool softeners and low-residue diet.

ASSESSMENT OF TRAINING

Patient care

Trainees should be supervised at all levels of training with regard to assessment of relevant history, imaging, physical examination, recommendations for diagnostic and/or therapeutic endoscopic options, development of management plan, and performance of essential procedures with special attention to assessment of competent performance of diagnostic/therapeutic endoscopy. Emphasis should be placed on proper patient selection for enteral stents, recognition of relative or absolute contraindications to stent placement, and procedural technique.

Medical knowledge

Trainees must possess a solid understanding of the role of enteral stents in benign and malignant GI disease. Trainees should have an understanding of the risks, benefits, and alternatives to these devices and be able to provide realistic expectations to patients regarding technical and clinical outcomes.

Interpersonal and communication skills

Trainees should be assessed with regard to their interpersonal and communication skills with patients and families regarding enteral stents. Many of these patients have advanced malignancy with shortened life expectancies and require adequate discussion as well as pre- and post-procedure communication.

Professionalism

Trainees should be sensitive and responsive to patients, staff, and colleagues while performing endoscopy.

Practice-based learning and improvement

Trainees should be assessed with regard to their ability to analyze and evaluate their endoscopic experiences and implement strategies to continually improve their quality of endoscopic practice and the ability to apply knowledge of study design and statistical methods to the appraisal of endoscopic studies. The enteral stent literature continues to evolve rapidly with regard to the stents available, the uses and indications, and complications and their management. Trainees should be committed to maintaining competency and a current knowledge of the state of the art via ongoing education and assessment of their clinical successes and complications with adjustment of practice as required.

System-based practice

Trainees should be assessed with regard to their ability to understand access and use resources and providers such as surgeons, oncologists, pathologists, and radiologists to provide optimal endoscopic care, the ability to apply evidence-based, cost-conscious strategies to prevention, diagnosis, and management of GI diseases. Many patients who require enteral stents have an underlying malignancy, and trainees should be familiar with and comfortable working as part of a multidisciplinary team.

SUMMARY

This enteral stent placement core curriculum was developed as an overview of the key components of the procedure in current practice. Although all trainees should have an exposure to these techniques, comprehensive training in enteral stenting to a level of competence for independent practice should be limited to individual fellows and programs with sufficient case volume, expertise, and trainee interest. Objective measures of competency in the performance of esophageal, enteral, and colonic stenting should be established during the training process. There are no firm guidelines as to how many of each type of procedure should be performed during training, but, in general, higher procedure volumes during training are expected to produce improved clinical outcomes.

DISCLOSURE

Dr Adler, consultant for BSC, BEE, and Merit; Dr Shami, Consultant for Olympus America; Dr McHenry, consultant for Conmed Endoscopic Technologies, Honorarium from Cook Endoscopy. All other authors disclosed no financial relationships relevant to this publication.

Abbreviations: ASGE, American Society for Gastrointestinal Endoscopy; GOO, gastric outlet obstruction; SEMS, self-expandable metal stent; TTS, through-the-scope.

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ADDITIONAL RESOURCES

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