Expandable Stents for Benign Esophageal Disease

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KEYWORDS

- Self-expandable esophageal metal stent
- Self-expandable esophageal plastic stent
- Biodegradable stent • Refractory benign esophageal stricture
- Esophageal perforation • Esophageal leak • Esophageal fistula
- Achalasia

The efficacy of self-expanding metal stents (SEMSs) in the palliation of malignant esophageal diseases has been extensively studied and published. With a greater than 95% technical success rate in placement and almost immediate relief in symptoms, SEMSs have become the most widely accepted modality used to palliate malignant dysphagia and/or malignant esophageal fistulae.[1–8] Compared with the previous semirigid plastic tubes, which were associated with higher complication rates,[4,5,8,9] SEMSs have a smaller diameter delivery catheter; thus, preinsertion dilatation of the esophageal stricture is not required in most patients. Despite this smaller diameter, once released, these stents can expand to large diameters; the expansion is gradual rather than abrupt and the stent can conform to the shape of the stricture. Where required, it is easy to deploy another stent into a previously placed stent. To prevent tumor in-growth, majority of the SEMS are partially covered with a plastic membrane. Since plastic covering makes SEMS susceptible to migration, the uncovered segments at the upper and lower ends of the stent allow for tissue in-growth and embedment (**Fig. 1**). Although this makes the stent nonremovable, removability is a not an issue when stents are used in patients with limited life expectancy. Experience in using SEMSs in those with limited life expectancy has also not given opportunity to evaluate their efficacy when used on a long-term basis. A study from the MD Anderson Cancer Center in Houston, Texas, showed that if SEMSs are kept in place for several weeks, even for malignant indications, patients can start experiencing significant and life-threatening complication (37%); a suggestion has been made that palliation of malignant dysphagia may be better accomplished by a combination

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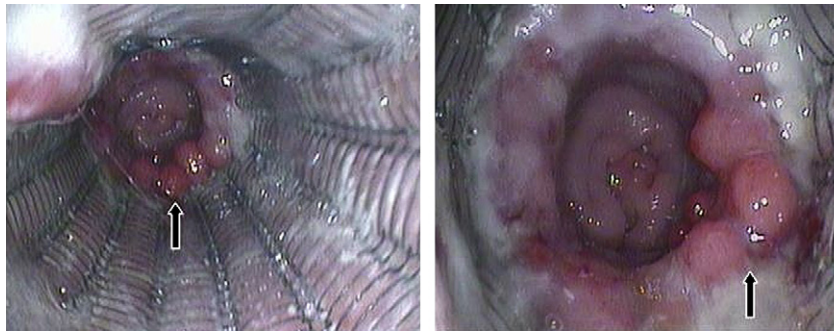

Fig. 1. Tissue in-growth into the lower uncovered segment of a partially covered self-expanding metal esophageal stent (*arrows*) (Ultraflex stent, Boston Scientific, Natick, MA).

of SEMS (immediate symptom relief) with brachytherapy and removal of SEMS after 4 to 6 weeks to avoid complications.[10,11]

With uncertainties regarding removability and complications associated with long-term use, SEMSs have not received widespread acceptance for benign esophageal disorders. Initial experience has been discouraging primarily because of granulation tissue in-growth into the uncovered part of SEMSs (see **Fig. 1**) as well as tissue embedment, making them difficult, if not impossible, to remove. Newer SEMSs that are fully covered, hence do not embed, are now available. These stents seem removable but are still not approved for benign indications. Recently, a fully covered self-expanding plastic esophageal stent (SEPS) (Polyflex, Boston Scientific, Natick, MA, USA) made of woven plastic strands (potentially inducing less tissue reaction compared with metal) was developed. This stent can be removed and is Food and Drug Administration (FDA) approved for treatment of benign refractory esophageal strictures. Another attractive concept has been the introduction of biodegradable stents, where the issue of removability does not exist because these stents eventually undergo metabolic degradation and absorption. With the availability of SEPSs, fully covered SEMSs (FC-SEMSs), and biodegradable stents, interest in using expandable stents for benign esophageal disorders has been revived. This review focuses on experience in using self-expanding stents for benign esophageal diseases with special emphasis on refractory benign esophageal strictures (RBESs) and benign esophageal perforations, leaks, and fistulae.

REFRACTORY BENIGN ESOPHAGEAL STRICTURES

Before embarking on endotherapy for esophageal stricture, it is important to establish that the stricture is benign by multiple biopsies and by imaging studies where needed. Similarly, it is important to address the primary cause of the stricture. For example, a peptic stricture is labeled as refractory if a patient is not receiving or is not compliant with strict antireflux measures. In addition to cause, the stricture anatomic characteristics may have influence on the outcomes of endotherapy. Benign esophageal strictures can either be classified as simple (short [<2 cm], straight, and wide enough to allow a standard 9.5-mm diameter endoscope to pass) or complex (long [>2 m], tortuous, multiple sites, and too narrow to allow passage of a standard endoscope). Besides esophageal rings and webs, simple strictures are generally peptic in origin whereas complex strictures can develop after corrosive injuries, radiation therapy,

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