



“Knitted” oesophageal stents: Superior conformability with no trade off

The Christie NHS Foundation Trust

J. R. Cain¹, T. Westwood¹, C. Gordon², R. A. Frost³, H-U. Laasch¹

Addresses ¹Radiology, The Christie NHS Foundation Trust, Manchester, ²Gastroenterology, The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust, Bournemouth, ³Radiology, Salisbury NHS Foundation Trust, Salisbury, United Kingdom

Introduction

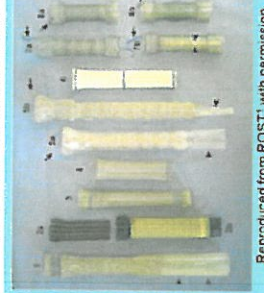
Oesophageal stent insertion:

- Malignant dysphagia is highly distressing for patients and aggravates malnutrition.
- Self expanding metal stent (SEMS) placement is a widely practiced method of maintaining oral feeding in such patients, offering rapid relief of symptoms¹.
- Fluoroscopic insertion offers the advantages of atraumatic cannulation, clear visualisation of the complete anatomy of the stricture, continuous visual control of stent deployment and reduced rates of perforation².
- Most SEMS are inserted using a preloaded delivery system advanced over a guide wire. Withdrawal of an outer sheath allows the stent to expand³.

Stent design:

- 25 stent designs have been commercially available in the UK over the last 10 years (fig 1).
- Most stents are covered by an outer membrane to prevent tissue overgrowth.
- The majority feature a conventional braided design that results in the generation of straightening forces limiting the alignment around tortuous anatomy and exerting continuous pressure on the oesophageal wall.
- Other features include purse strings to allow removal by traction, and optional anti-reflux valves.

Figure 1: Available stents: (1) Glanurco, (2a) uncovered ultraflex, (2b) covered ultraflex, (3) Flamingo Wallstent, (4) Covered Wallstent, (5a) Initial Fer-X Ella anti-reflux, (5b) Revised Fer-X Ella, (6) Polyflex removable plastic, (7a) Removable Choo, (7b) Removable Do anti-reflux, (8a) Removable Nitit-S single, (8b) Removable Nitit-S double.



Reproduced from ROST⁴, with permission.

EGIS device:

- The first covered removable oesophageal stent is now available consisting of a knitted Nitinol skeleton (fig 2).
- Knitted enteral stents have reduced stent shortening and no axial straightening forces, resulting in better conformability to tortuous anatomy.
- In vitro it has better conformability but comparable radial force to standard braided stents.
- The large stent heads are covered in silicone, but the shaft is only externally covered by an expanded polytetrafluoroethylene (ePTFE) membrane (fig 3).



Figure 2: The knitted design of the EGIS stent offers superior conformability. The device features large silicone covered heads and purse strings for retrieval.



Figure 3: EGIS stent with the ePTFE membrane partially removed to demonstrate the knitted Nitinol skeleton

- The device is also available with an anti-reflux valve for cases necessitating placement of the distal end of the stent below the gastro oesophageal junction.
- All models feature purse strings allowing endoscopic removal with forceps (figs 2, 4a, 4b).
- We report the first experience world-wide with this type of device.



Figure 4a: Inverted EGIS stent immediately after endoscopic removal.



Figure 4b: The same stent cleaned with the intact ePTFE membrane now on the inside.

Purpose:

We report the first experience worldwide of the use of knitted oesophageal stents

Methods

- All consecutive patients over a 9 month period referred for oesophageal stenting had an EGIS (BVM Medical, Hinckley, UK / S&G Biotech, Seoul, Korea) placed under fluoroscopic guidance.
- Stents with anti-reflux valve were used if the lower end had to be placed in the stomach.
- Patients were followed up prospectively until death or stent failure.
- Clinical outcome was compared to the results from the national Registry of Oesophageal Stenting (ROST)⁴.
- The device is CE marked and was used within its license. Institutional review board was nevertheless sought and granted.
- The manufacturer made 30 stents were available for evaluation free of charge.

Results

- 26 patients with malignant dysphagia and 2 with a benign post-radiation stricture had an EGIS oesophageal stent inserted.
- Median immediate stent expansion at insertion was 50% (25-100) increasing to 100% (60-100) after 1 week.
- Minor complications occurred in 4% compared to 14% in the national audit.
- One stent migrated from the oesophagus above the cardia (3.8%), and 2/16 stents (12.5%) placed across the GO-junction migrated, comparing favourably to a migration rate of 4.3% (mid-oesophagus) and 18% (cardia) from the national audit (fig 5).

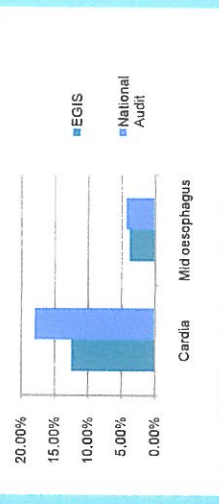


Figure 5: Chart comparing the rates of migration of the EGIS device to rates from national audit (ROST) data.

Improvement in dysphagia was comparable to national figures from ROST with a pre-stent median score of 3 (2-4) improving to 2 (0-3) at 48 hours and to 1 (1-3) after 1 week.

No perforation, haemorrhage or aspiration occurred.

The 2 stents inserted for benign strictures were removed endoscopically by inversion through capture of the lower purse string.

Initial difficulties with the delivery system and the material of the retrieval strings were identified and corrected by the manufacturer.

Conclusions:

- Limited first experience shows the EGIS oesophageal stent to perform comparably with a large variety of existing oesophageal stents.
- There may be a small benefit in terms of reduced stent migration, particularly if placed across the adverse anatomy of the GO-junction, but more extensive experience is required.
- Palliation of dysphagia is as good as with conventional stents.
- Initial stent expansion is slower than with braided stents, associated with a trend towards reduced chest pain.
- Balloon dilatation should only be considered if there is inadequate symptom relief after 1 week.
- The stent should be particularly considered in tortuous anatomy due to the excellent conformability.
- Knitted oesophageal stents benefit from increased conformity and have performance least as good as the large variety of existing oesophageal stents.

References:

1. Sharma P, Kozarek R. Role of oesophageal stents in benign and malignant diseases. Am J Gastroenterol 2010; 105: 258 – 273
2. Laasch H-U, Lee S, Moss J G, Rooibottom C, Kinsman R., Walton P K. Registry of Esophageal Stenting. British Society of Interventional Radiology 2004 edition. Published by Dendrite Clinical Systems.
3. Laasch H-U et al. Interventional radiology for the management of inoperable carcinoma of the oesophagus. Endoscopy 2003; 35: 1049 – 1059.