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• BRIEF REPORTS •

Follow-up evaluation for benign stricture of upper gastrointestinal tract with stent insertion

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Abstract

AIM: To determine the best mothod for benign stricture of the upper gastrointestinal tract (UGIT) with stent insertion by follow-up evaluation.

METHODS: A total of 110 stents insertions were performed in 110 cases of benign stricture of the UGIT. Permanent (group A) and temporary (group B) placement of an expandable metal stent in 30 cases and 80 cases respectively. All cases were completed under fluoroscopy.

RESULTS: In group A, 30 uncovered or antireflux covered or partially covered expandable metal stents were placed permanently. In group A, 5 cases (16.7 %) in 3-months, 5 cases (20.0 %) in 6-months, 6 cases (25 %) in the 1st year, 6 cases (50 %) in the 3rd year, and 4 cases (80 %) in the 5th year exhibited dysphagia relapse. In group B, a partially-covered expandable metal stent was temporarily placed in each patient and removed after 3-7 days via gastroscopy. Follow-up data in this group showed that 8 cases (7.5 %) in 3-months, 9 cases (12.0 %) in 6-months,10 cases (15.4 %) in the 1st year, 6 cases (20 %) in the 3rd year, and 3 cases (25 %) in the 5th year exhibited dysphagia relapse. The placement and withdrawal of all stents were all performed successfully. The follow-up of all cases lasted for 3-99 months (mean 41.6±19.7 months).

CONCLUSION: The best mothod for benign stricture of UGIT with stent insertion is temporary placement of a partially-covered expandable metal stent.

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INTRODUCTION

Benign stricture of the upper gastrointestinal tract (UGIT) refers to stenosis caused by benign pathological changes in the pharynx, esophagus, stomach, and duodenum. Such stenosis includes marginal stricture after surgery, chemical-burn-related stricture, simple scar-related stricture after radiation therapy for tumor, digestive stricture, and functional stricture (achalasia). Since July 1994 , 110 cases with benign stricture of the UGIT have been treated with stent insertion and followed-up. We herein report our experiences.

MATERIALS AND METHODS

Materials

Our subjects were 110 patients with benign stricture of the UGIT (61 males, 49 females; age 18-84 years, mean 53.9 years). Sequential trials were adopted for these cases who were nonrandomly divided into the following two groups according to the method of stent insertion: 30 cases with permanent uncovered or antireflux covered or partially covered metal stent dilation (group A), and 80 cases with temporary partially covered metal stent dilation (group B). In group A there were 6 cases of simple cicatricial stricture after radiation therapy for esophageal carcinoma, 8 cases of achalasia, 13 cases of esophageal and esophagogastric marginal stricture, 2 cases of gastroduodenal marginal stricture, and 1 case of esophageal chemical-burn-related stricture. The mean diameter of the strictured UGIT was 3.2±2.3 mm before stent placement and 17.8±2.4 mm after stent placement. In group B there were 2 cases of simple scar-related stricture after radiation therapy for esphageal carcinoma, 67 cases of achalasia, 9 cases of esophageal and esophagogastric marginal stricture,and 2 cases of esophageal chemical burn. The mean diameter of the strictured UGIT was 3.3±2.1 mm before stent placement and 22.3±2.7 mm after stent placement. All cases had dysphagia grades 2-4 before stent insertion and dysphagia grades 0-2 after stent insertion. All casess were examined by barium-meal radiography of the UGIT and gastroscopy.

Methods

It involved an empty stomach for at least 4 h and examination of the normal bleeding and clotting time. Two types of metal stent were used: covered stainless steel wire Z-stent (COOK, USA), and partially covered or uncovered or antireflux covered nitinol stent (Zhiye Medical Equipment Research Institute, Changzhou, China; and Youyan Yijin Advanced Materials Co. Ltd, Beijing, China). The COOK stents were constructed from multiple fragments, each fragment was typically 2-cm long. The stent was completely coated on the outer layer and mounted with a metal barb. The diameter of the stent body was 18 mm and that of the horn was 25 mm. The body of the partially covered metal stents was coated with intracavity silica gel. The areas within 2 cm of both ends of the stents were not covered. Stents were 4-14 cm in length and 16-30 mm in diameter. They had single or double horns, the horn diameter was 20-35 mm.

The different types of metal stents were placed differently. For example, placement of the partially-covered nitinol internal stent used in groups B and C firstly involved spraying the

pharynx with 1% lidocaine (as a mist) for anesthesia. When a stent was a placed, the patients were placed in a sitting position or lying on the side, and where applicable with their false teeth removed and a teeth bracket mounted. A 260-cm-long guidewire was first led into the distal end of the benign stricture. The stent was mounted on the propeller whose front end was coated with sterilized liquid paraffin. Guided by the wire, the propeller on which the stent was mounted was moved through the strictured section. Under fluoroscopic control, the outer sheath was slowly withdrawn and the stent expanded under its own tension. After the stent was placed, radiography was performed to observe the patency of the UGIT. In group B, 500-1 000 ml of ice-cold water was injected 3-7 days after stent placement via a bioptic hole under gastroscopy, which caused the stent to reduce its diameter. Bioptic pliers were then used to withdraw the stent using a gastroscope. Gastroscopy was performed again in the UGIT to detect complications, such as bleeding, mucosal tearing, or perforation of the UGIT. The patients returned to the ward and consumed cold drinks and snacks for 2 days before resuming a normal diet. It was preferable for patients to eat solid food since the natural expansion caused by ingesting food reduced the retraction of the UGIT.

Criteria for therapeutic efficacy included diameter of the most-strictured section of the UGIT before and after dilation, and dysphagia score before and after dilation.

After stent placement barium-meal radiography was performed to observe patency of the UGIT. The patients ate semifluid food on the day after surgery, and were treated with antibiotics, antacids, and antireflux drugs. One week after stent removal, barium-meal radiography of the UGIT was performed to observe patency of the UGIT. The patients went to a clinic or were followed-up by telephone at the 3rd, 6th months, 1st, 3rd and 5th year.

RESULTS

In group A, 30 uncovered or antireflux covered or partially-covered stents were placed. Stent placement was successful in all the cases. In group B, 80 partially- covered stents were placed and removed under gastroscopy guidance 3-7 days after stent insertion. The successful rate of stent placement and extraction was 100 %. Relapse rate of dysphagia treated with stent insertion during follow-up is shown in Table 1.

DISCUSSION

Since Domschke *et al*[1] reported the first successful treatment of malignant esophageal strictures with an uncovered expandable metal stent in 1990, placement of covered or uncovered or antireflux covered expandable UGIT metal stents has been shown to be a safe, easy, and effective treatment for malignant UGIT strictures. Cwikiel *et al*[2] reported the first successful treatment of benign esophageal strictures in 1993. Cheng *et al*[3] reported the first successful treatment of benign esophageal strictures with temporary partially covered stent in 1999. Many patients with benign UGIT strictures have received treatment with uncovered or covered or temporary partially covered metal stents[4-26]. Permanent uncovered metal stent insertion for benign functional stricture in the UGIT had poor mid-term and long-term therapeutic efficiency, mainly due to frequent severe gastroesophageal reflux and restenosis (hyperplasia of granulation tissue). After a 12-month follow-up, three uncovered metal stents could not be removed in three cases of achalasia, and we had to resect and reconstruct the esophageal cardia. Therefore, permanent uncovered metal stent dilation is not suitable for cases of functional stricture of the UGIT. Permanent partially covered metal stent dilation had poor mid-term and long-term therapeutic efficiency, mainly due to reflux and stent migration[27-37].

Temporary partially-covered metal stent dilation was used for benign stricture of the UGIT with both excellent immediate and mid- and long-term therapeutic efficacy. Firstly, the design of the stent coincided with the specific anatomy of the UGIT and pathological manifestations of benign stricture. If a stent was not well designed, it did not exhibit therapeutic efficacy, and was also associated with a higher frequency of complications such as stent migration. With the aim of solving these problems, we designed a special stent for benign stricture of the UGIT. The stent was partially covered. A membrane covered the inner wall of the stent, with the area within 2 cm of the stent orifice not covered. The upper orifice of the stent was a large horn, which increased the stability of the stent but made it difficult to withdraw. Secondly, the diameter of the stents used in this group was 16-30 mm. By dilating the stent, the stricture could almost be returned to the maximum diameter of a normal strictured UGIT. What the diameter of a stent is most appropriate is that the stent should expand the strictured part without complications. We found that the bigger the diameter of stents was, the better the mid- and long-term therapeutic efficacy was ,but the ideal size still needs to be further investigated.

The further development of biologically degraded stents for the gastrointestinal tract would provide advantages of a very long retention time without the necessity to remove the stent[38]. This would provide potentially superior stent insertion for cases of benign stricture of the UGIT. In the treatment of UGIT benign stricture with stent insertion, temporary partially-covered metal stent dilation will gradually replace others and become the preferred method for the nonsurgical treatment of

Table 1 Relapse rate of dysphagia treated with stent insertion

Group	Follow-up >3 months (*n*)	Dysphagia relapse (*n*)	Dysphagia relapse rate (%)	Follow-up >6 months year (*n*)	Dysphagia relapse (*n*)	Dysphagia relapse rate (%)
A	30	5	16.7%	25	5	20.0%
B	80	8	7.5%	75	9	12.0%

Group	Follow-up>1st year (*n*)	Dysphagia relapse (*n*)	Dysphagia relapse rate (%)
A	24	6	25.0 %
B	65	10	15.4 %

Group	Follow-up >3rd year (*n*)	Dysphagia relapse (*n*)	Dysphagia relapse rate (%)	Follow-up >5th year (*n*)	Dysphagia relapse (*n*)	Dysphagia relapse rate (%)
A	12	6	50.0 %	5	4	80.0%
B	30	6	20.0 %	12	3	25.0%

benign stricture in gastrointestinal tract due to its superior mid-term and long-term therapeutic efficacy[39,40].

According to our experiences in the treatment of 110 casess of benign stricture of the UGIT with stent insertion, we consider that the method chosen for an individual case should be based on the nature of the stricture, course of disease, and complications. Moreover, long-term therapeutic efficacy and medical expense need to be comprehensively assessed. Finally, other combined therapies should be carried out concurrently both before and after the treatment in order to achieve a high therapeutic efficacy.

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