

# Complications of stent placement for benign stricture of gastrointestinal tract

Ying-Sheng Cheng, Ming-Hua Li, Wei-Xiong Chen, Ni-Wei Chen, Qi-Xin Zhuang, Ke-Zhong Shang

**Ying-Sheng Cheng, Ming-Hua Li, Qi-Xin Zhuang, Ke-Zhong Shang**, Department of Radiology, Sixth People's Hospital, Shanghai Jiaotong University, Shanghai 200233, China

**Wei-Xiong Chen, Ni-Wei Chen**, Department of Gastroenterology, Sixth People's Hospital, Shanghai Jiaotong University, Shanghai 200233, China

**Supported by** the National Key Medical Research and Development Program of China during the 9<sup>th</sup> Five-year Plan Period, No.96-907-03-04; Shanghai Nature Science Funds, No.02Z1314073; Shanghai Medical Development Funds, No.00419

**Correspondence to:** Dr. Ying-Sheng Cheng, Department of Radiology, Sixth People's Hospital, Shanghai Jiaotong University, Shanghai 200233, China. chengys@sh163.net

**Telephone:** +86-21-64368920 **Fax:** +86-21-64701361

**Received:** 2003-05-13 **Accepted:** 2003-06-02

## Abstract

**AIM:** To observe the frequent complications of stent placement for stricture of the gastrointestinal tract and to find proper treatment.

**METHODS:** A total number of 140 stents were inserted in 138 patients with benign stricture of the gastrointestinal tract. The procedure was completed under fluoroscopy in all of the patients.

**RESULTS:** Stents were successfully placed in all the 138 patients. Pains occurred in 23 patients (16.7%), slight or dull pains were found in 21 patients and severe chest pain in 2 respectively. For the former type of pain, the patients received only analgesia or even no treatment, while peridural anesthetics was conducted for the latter condition. Reflux occurred in 16 of these patients (11.6%) after stent placement. It was managed by common antireflux procedures. Gastrointestinal bleeding occurred in 13 patients (9.4%), and was treated by hemostat. Restenosis of the gastrointestinal tract occurred in 8 patients (5.8%), and was apparently associated with hyperplasia of granulation tissue. In 2 patients, the second stent was placed under X-ray guidance. The granulation tissue was removed by cauterization through hot-node therapy under gastroscop guidance in 3 patients, and surgical reconstruction was performed in another 3 patients. Stent migration occurred in 5 patients (3.6%), and were extracted with the aid of a gastroscop. Food-bolus obstruction was encountered in 2 patients (1.4%) and was treated by endoscope removal. No perforation occurred in all patients.

**CONCLUSION:** Frequent complications after stent placement for benign stricture of the gastrointestinal tract include pain, reflux, bleeding, restenosis, stent migration and food-bolus obstruction. They can be treated by drugs, the second stent placement or gastroscopic procedures depend on the specific condition.

Cheng YS, Li MH, Chen WX, Chen NW, Zhuang QX, Shang KZ. Complications of stent placement for benign stricture of gastrointestinal tract. *World J Gastroenterol* 2004; 10(2): 284-286 <http://www.wjgnet.com/1007-9327/10/284.asp>

## INTRODUCTION

Stricture of the gastrointestinal tract is a common complication associated with various diseases of the gastrointestinal tract. Previously, such conditions were treated surgically in most patients. Operational difficulties and increased expense have limited its application. The recently established non-vascular stent technology could provide a new approach for such patients<sup>[1]</sup>. The procedure has been proved to be effective, but it has various complications<sup>[2-5]</sup>. Since 1994, we have placed gastrointestinal stents for benign stricture in 138 patients. Various complications were encountered and treated effectively.

## MATERIALS AND METHODS

### Materials

Our cohort comprised 138 patients (81 males, 57 females; ages, 18 to 82 years, mean 53.6 years) with benign stricture of gastrointestinal tract. All patients were examined by endoscopy or gastrointestinal barium radiography. Among the 138 patients, 8 had simple sclerosis stricture after radiation therapy for esophageal carcinoma, 86 had achalasia, 36 had esophageal and esophago-gastric anastomosis stricture (complicated with anastomosis fistula in 2), 4 had gastro-duodenal anastomosis stricture, and 4 had esophageal chemical corrosive stricture. All the patients had dysphagia, frequent vomiting, and/or dysphoria before stent placement. The follow-up lasted for 1 week to 8 years.

### Methods

Stents were placed in all of the 138 patients under X-ray guidance. For the patients with serious stricture, a probe or saccule was used repeatedly to expand the lesion before stent placement. A total of 140 stents were placed, with two stents at the same site in 2 patients.

## RESULTS

Various complications encountered are listed in Table 1.

**Table 1** Complications of stent placement for benign stricture of gastrointestinal tract

Type of complication	Patients (n)	Incidence (%)
Pain	23	16.7
Slight or mild	21	15.2
Severe	2	1.5
Reflux	16	11.6
Bleeding	13	9.4
Restonsis	8	5.8
Stent migration	5	3.6
Food-bolus obstruction	2	1.4

Complications were treated according to the specific conditions in each patient. Slight or mild pains ( $n=21$ ) that did not affect work and rest were not treated ( $n=12$ ) and that affecting work and rest were treated with analgesics ( $n=9$ ). For the 2 patients who had severe pain, an analgesic was first

used. This was not effective, peridural anesthesia was conducted and the pain disappeared within 2 days. Sixteen patients had gastro-esophageal or duodenum-gastro biliary regurgitation. Thirteen patients who had gastro-esophageal reflux after stent placement in cardiac achalasia were treated with antacid agent (omeprazole), gastric mucosa protectant (sucralfate) and dynamic medicine (domperidone) for 2 weeks or longer. Administration of medicines was reduced or suspended when symptoms palliated. Thirteen patients exhibited bleeding after stent placement. The bleeding disappeared 2 weeks after venous injection of adrenobazonum. Recurrence of the stricture was observed after stent placement in 8 patients. The second stent was placed in 2 patients under X-ray guidance. Hyperplasia of granulation tissue was cauterized by hot-node therapy in 3 patients under gastroscopie and surgically reconstructed in 3 patients. Stent migration was encountered in 5 patients, and the stent was extracted with the aid of a gastroscopie. Two patients had food-bolus obstruction. It was removed under gastroscopie guidance. No perforation occurred in this series.

## DISCUSSION

Complications were frequently encountered after stent placement in benign stricture of gastrointestinal tract<sup>[1-3]</sup>. The application of this approach would be hampered if these complications were not well treated. The occurrence of complications was related to the material and structure of stents and skill of the operator. It was also associated with the region and nature of pathological changes and physiques of the patients<sup>[4-6]</sup>. However, treatment of the complications remains difficult.

Pain is one of the common complications after stent placement in benign stricture of gastrointestinal tract, and it usually disappears within 2-4 weeks. The causes of pain are diverse. In terms of stent-related reasons, one is the resulted physical expansion, the other is that pain occurs more frequently in patients with severe lesions. Pain is also closely associated with sites of the lesions. The upper part of the esophagus is sensitive to pain, and mucosa erosion occurs more frequently in lower part due to reflux, resulting in a burning sensation. A stent with a diameter of 16 mm was used for patients with serious stricture, stricture at the upper or lower part of the esophagus. This reduced the pain markedly. Severe pain occurred in 2 patients after stent placement. When omeprazole was suspended, a severe chest pain was complained by the patients 3 days later. Treatment with dolantin was not satisfactory, and venous injection of omeprazole and peridural anesthesia were used for 2 days to relieve the pain. In terms of pain after stent placement, the incidence (16.7%) was slightly higher than those reported previously<sup>[7-26]</sup>. This may be attributable to the types of lesions and size of the stents. In our series, all patients had benign stricture and large diameter stents were used.

Reflux was mostly associated with pathological changes at the lower part of the esophagus. Expansion by the stents often caused disruption of the lower sphincter of esophagus, resulting in reflux. This problem could cause reflux esophagitis. After stent placement in cardiac achalasia, both reflux and bleeding occurred in three patients and disappeared after treatment with antacid agent, hemostat, and antireflux agent. The incidence of reflux esophagitis (11.6%) in our patients was similar to those previously reported (10-50%). The incidence of bleeding (9.4%) was also similar to those described by other authors<sup>[27-34]</sup>.

Restenosis of the gastrointestinal tract is a thorny problem after stent placement. Benign restenosis is primarily caused by hyperplasia of granulation tissue, this was particularly true, while uncovered stents were used. We adopted one of the procedures for the restenosis including placement of the second stent, or cauterization through hot-node therapy or surgical reconstruction. However, in some patients covered stents could

not be used for anatomical and pathological reasons, such as the ampullary region (open end of the choledochus) or the descending part of the duodenum. Covered stents could easily cause obstructive jaundice, and uncovered stents were used in such patients. The incidence of restenosis in our series (5.8%) was among the range as reported by other authors (3-20%)<sup>[35-38]</sup>.

Stent migration was a complication that occurred within one to four weeks in most patients after stent placement in the gastrointestinal tract. In a few patients it occurred 3 months after stent placement. Typically, this occurred most frequently in patients with covered stents. The displaced stents were extracted under gastroscopie guidance. The incidence of stent displacement in our series (3.6%) was in the range as reported previously (0-12.5%)<sup>[39-42]</sup>.

The incidence of food-bolus obstruction reported in other countries ranged from 7% to 20%<sup>[11]</sup>, while it was 1.4% in our series. After stent placement, we provided the patients with a fluid or semi-fluid diet at the early stage, a small amount each time and several times a day. Patient compliance with this advice could explain, at least partially, the low incidence of food-bolus obstruction in our series. When this complication occurred, food-bolus could be removed under gastroscopie. Perforation in the gastrointestinal tract was rare<sup>[43-46]</sup>. If happened, a second covered stent should be placed or surgery should be conducted immediately.

In patients with malignant pathological changes, stent placement in the gastrointestinal tract was very useful for improving their quality of life. For patients with benign strictures, however, caution was required when placing a stent, especially when it was intended to be permanent. Recoverable stents and biologically degradable stents can be expected to overcome the difficulties and prevent restenosis. This would also reduce the incidence of stent-related complications.

## REFERENCES

- 1 **Wong VS**, Garvey CJ, Morris AI. Splitting of the polyethylene coverings as a previously unrecognized complication of oesophageal metallic covered stent (Gianturco-Rosch) inserted for malignant stricture. *Endoscopy* 1998; **30**: 557
- 2 **Boulis NM**, Armstrong WS, Chandler WF, Orringer MB. Epidural abscess: a delayed complication of esophageal stenting for benign stricture. *Ann Thorac Surg* 1999; **68**: 568-570
- 3 **Mayoral W**, Fleischer D, Salcedo J, Roy P, Al-Kawas F, Benjamin S. Nonmalignant obstruction is a common problem with metal stents in the treatment of esophageal cancer. *Gastrointest Endosc* 2000; **51**: 556-559
- 4 **Mauro MA**, Koehler RE, Baron TH. Advances in gastrointestinal intervention: the treatment of gastroduodenal and colorectal obstructions with metallic stents. *Radiology* 2000; **215**: 659-669
- 5 **Wang MQ**, Sze DY, Wang ZP, Wang ZQ, Gao YA, Dake MD. Delayed complications after esophageal stent placement for treatment of malignant esophageal obstructions and esophagorespiratory fistulas. *J Vasc Interv Radiol* 2001; **12**: 465-474
- 6 **Power C**, Rynne M, O'Gorman T, Maguire D, McAnena OJ. An unusual complication following intubation of a benign oesophageal stricture. *Endoscopy* 2001; **33**: 642
- 7 **Rajjman I**, Siddique I, Ajani J, Lynch P. Palliation of malignant dysphagia and fistulae with coated expandable metal stents: experience with 101 patients. *Gastrointest Endosc* 1998; **48**: 172-179
- 8 **Laasch HU**, Nicholson DA, Kay CL, Attwood S, Bancewicz J. The clinical effectiveness of the Gianturco oesophageal stent in malignant oesophageal obstruction. *Clin Radiol* 1998; **53**: 666-672
- 9 **Karras PJ**, Barawi M, Webb B, Michalos A. Squamous cell papillomatosis of esophagus following placement of a self-expanding metal stent. *Dig Dis Sci* 1999; **44**: 457-461
- 10 **Park HS**, Do YS, Suh SW, Choo SW, Lim HK, Kim SH, Shim YM, Park KC, Choo IW. Upper gastrointestinal tract malignant obstruction: initial results of palliation with a flexible covered stent. *Radiology* 1999; **210**: 865-870
- 11 **Pron G**, Common A, Simons M, Ho CS. Interventional radiology

- and the use of metal stents in nonvascular clinical practice: a systematic overview. *J Vasc Interv Radiol* 1999; **10**: 613-628
- 12 **Morgan R**, Adam A. The radiologist's view of expandable metallic stents for malignant esophageal obstruction. *Gastrointest Endosc Clin N Am* 1999; **9**: 431-435
- 13 **Camunez F**, Echenagusia A, Simo G, Turegano F, Vazquez J, Barreiro-Meiro I. Malignant colorectal obstruction treated by means of self-expanding metallic stents: effectiveness before surgery and in palliation. *Radiology* 2000; **216**: 492-497
- 14 **Law WL**, Chu KW, Ho JW, Tung HM, Law SY, Chu KM. Self-expanding metallic stent in the treatment of colonic obstruction caused by advanced malignancies. *Dis Colon Rectum* 2000; **43**: 1522-1527
- 15 **Gomez Herrero H**, Paul Diaz L, Pinto Pabon I, Lobato Fernandez R. Placement of a colonic stent by percutaneous colostomy in a case of malignant stenosis. *Cardiovasc Intervent Radiol* 2001; **24**: 67-69
- 16 **Tominaga K**, Yoshida M, Maetani I, Sakai Y. Expandable metal stent placement in the treatment of a malignant anastomotic stricture of the transverse colon. *Gastrointest Endosc* 2001; **53**: 524-527
- 17 **Maetani I**, Ukita T, Inone H, Yoshida M, Igarashi Y, Sakai Y. Knitted nitinol stent insertion for various intestinal stenoses with a modified delivery system. *Gastrointest Endosc* 2001; **54**: 364-367
- 18 **Mao AW**, Gao ZD, Xu JY, Yang RJ, Xiao XS, Jiang TH, Jiang WJ. Treatment of malignant digestive tract obstruction by combined intraluminal stent installation and intra-arterial drug infusion. *World J Gastroenterol* 2001; **7**: 587-592
- 19 **Adler DG**, Baron TH, Geels W, Morgan DE, Monkemuller KE. Placement of PEG tubes through previously placed self-expanding esophageal metal stents. *Gastrointest Endosc* 2001; **54**: 237-241
- 20 **Razzaq R**, Laasch HU, England R, Marriott A, Martin D. Expandable metal stents for the palliation of malignant gastroduodenal obstruction. *Cardiovasc Intervent Radiol* 2001; **24**: 313-318
- 21 **McGrath JP**, Browne M, Riordan C, Ravi N, Reynolds JV. Expandable metal stents in the palliation of malignant dysphagia and oesophageal-respiratory fistulae. *Ir Med J* 2001; **94**: 270-272
- 22 **Decker P**, Lippler J, Decker D, Hirner A. Use of the Polyflex stent in the palliative therapy of esophageal carcinoma: results in 14 cases and review of the literature. *Surg Endosc* 2001; **15**: 1444-1447
- 23 **Aviv RI**, Shyamalan G, Watkinson A, Tibballs J, Ogunbaye G. Radiological palliation of malignant colonic obstruction. *Clin Radiol* 2002; **57**: 347-351
- 24 **Martinez-Santos C**, Lobato RF, Fradejas JM, Pinto I, Ortega-Deballon P, Moreno-Azcoita M. Self-expandable stent before elective surgery vs emergency surgery for the treatment of malignant colorectal obstructions: comparison of primary anastomosis and morbidity rates. *Dis Colon Rectum* 2002; **45**: 401-406
- 25 **Sanchez W**, Baron TH. Palliative colonic stent placement. *Gastrointest Endosc* 2002; **56**: 735
- 26 **Zhong J**, Wu Y, Xu Z, Liu X, Xu B, Zhai Z. Treatment of medium and late stage esophageal carcinoma with combined endoscopic metal stenting and radiotherapy. *Chin Med J* 2003; **116**: 24-28
- 27 **Keymling M**. Colorectal stenting. *Endoscopy* 2003; **35**: 234-238
- 28 **May A**, Ell C. Palliative treatment of malignant esophagorespiratory fistulas with Gianturco-Z stents. A prospective clinical trial and review of the literature on covered metal stents. *Am J Gastroenterol* 1998; **93**: 532-535
- 29 **Bastos I**, Gomes D, Gregorio C, Baranda J, Gouveia H, Donato A, de Freitas D. An unusual foreign body in the rectum. *Hepatogastroenterology* 1998; **45**: 1587-1588
- 30 **Davies N**, Thomas HG, Eyre-Brook IA. Palliation of dysphagia from inoperable oesophageal carcinoma using Atkinson tubes or self-expanding metal stents. *Ann R Coll Surg Engl* 1998; **80**: 394-397
- 31 **Conio M**, Caroli-Bosc F, Demarquay JF, Sorbi D, Maes B, Delmont J, Dumas R. Self-expanding metal stents in the palliation of neoplasms of the cervical esophagus. *Hepatogastroenterology* 1999; **46**: 272-277
- 32 **Sandha GS**, Marcon NE. Expandable metal stents for benign esophageal obstruction. *Gastrointest Endosc Clin N Am* 1999; **9**: 437-446
- 33 **Paul L**, Pinto I, Gomez H, Fernandez-Lobato R, Moyano E. Metallic stents in the treatment of benign diseases of the colon: preliminary experience in 10 cases. *Radiology* 2002; **223**: 715-722
- 34 **Lee A**, Forbes K. Esophageal stents may interfere with the swallowing reflex: an illustrative case history. *J Pain Symptom Manage* 1998; **16**: 254-258
- 35 **McManus K**, Khan I, McGuigan J. Self-expanding oesophageal stents: strategies for re-intervention. *Endoscopy* 2001; **33**: 601-604
- 36 **Kaneko K**, Ito H, Konishi K, Kurahashi T, Katagiri A, Katayose K, Kitahara T, Ohtsu A, Mitamura K. Implantation of self-expanding metallic stent for patients with malignant stricture after failure of definitive chemoradiotherapy for T3 or T4 esophageal squamous cell carcinomas. *Hepatogastroenterology* 2002; **49**: 699-705
- 37 **Nemoto K**, Takai Y, Ogawa Y, Kakuto Y, Ariga H, Matsushita H, Wada H, Yamada S. Fatal hemorrhage in irradiated esophageal cancer patients. *Acta Oncol* 1998; **37**: 259-262
- 38 **Kennedy C**, Steger A. Fatal hemorrhage in stented esophageal carcinoma: tumor necrosis of the aorta. *Cardiovasc Intervent Radiol* 2001; **24**: 443-444
- 39 **Sen S**, Balaratnam N, Wood LA, Allison MC. Buckling of redundant expansile stent distal to an oesophageal cancer: endoscopic management. *Endoscopy* 1998; **30**: 422-424
- 40 **Von Schonfeld J**. Endoscopic retrieval of a broken and migrated esophageal metal stent. *Z Gastroenterol* 2000; **38**: 795-798
- 41 **De Palma GD**, Iovino P, Catanzano C. Distally migrated esophageal self-expanding metal stents: wait and see or remove? *Gastrointest Endosc* 2001; **53**: 96-98
- 42 **Di Fiore F**, Lecleire S, Antonietti M, Savoye G, Savoye-Collet C, Herve S, Roque I, Hochain P, Ben Soussan E. Spontaneous passage of a dislocated esophageal metal stent: report of two cases. *Endoscopy* 2003; **35**: 223-225
- 43 **Banerjee A**, Rao KS, Nachiappan M. Intrathoracic oesophageal perforations following bougienage: a protocol for management. *Aust N Z J Surg* 1989; **59**: 563-566
- 44 **Pajarinen J**, Ristkari SK, Mokka RE. A report of three cases with an oesophageal perforation treated with a coated self-expanding stent. *Ann Chir Gynaecol* 1999; **88**: 332-334
- 45 **Kim HC**, Han JK, Kim TK, Do KH, Kim HB, Park JH, Choi BI. Duodenal perforation as a delayed complication of placement of an esophageal stent. *J Vasc Interv Radiol* 2000; **11**: 902-904
- 46 **Sarmiento RI**, Lee DW, Wong SK, Chan AC, Chung SC. Mesenteric perforation of an obstructing sigmoid colon tumor after endoluminal stent insertion. *Endoscopy* 2003; **35**: 94

Edited by Wang XL