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Using our own developed stent in the palliative treatment of obstruction in the left half of the colon due to ovarian cancer

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ABSTRACT

Objectives: An assessment of implantation efficacy and safety of self-developed self-expanding stent in patients with an ovarian cancer induced by intestinal obstruction.

Material and methods: The study of the stenting efficacy and safety was realized prospectively. The group consisted of 13 patients with left half colon obstruction due to an inoperable metastatic ovarian carcinoma. All the patients had a histopathologically diagnosed ovarian carcinoma and were treated in the past both surgically and systemically. Stenting was preceded by a Computed Tomography (CT) scan confirming and locating the obstruction. Patients with a multilevel intestinal obstruction were disqualified.

Results: Nine stents were implanted in the rectosigmoid; 4 stents were implanted in an externally compressed rectum. One migration of implanted stent was observed. In one case 2 stents were implanted due to an insufficient coverage of the stricture. The decompression of the obstruction of the gastrointestinal tract was achieved in 11 patients (85%).

Conclusions: 1) The implantation of our own developed, self-expanding stent is effective and safe. 2) The implantation of the stent in patients with an inoperable ovarian cancer causing an obstruction of the gastrointestinal tract is an effective procedure limiting postoperative complications and improving life comfort by avoiding stoma.

Key words: cancer-induced intestinal obstruction, ovarian carcinoma, stent

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INTRODUCTION

The obstruction of the gastrointestinal tract in an advanced ovarian carcinoma is common. During the last six months of their life, about 31% of patients are hospitalized due to an intestinal obstruction [1]. In the past, the commonly choosen treatment was surgery, often resulting in a colostomy or ileostomy. A surgical treatment of intestinal obstruction in patients with a recurrent ovarian cancer often results in complications 22%, including abscesses, peritonitis, intestinal fistulas, as well as a 6% perioperative mortality rate [1].

A description of an intestinal stent implantation was first published by Dohmoto in 1990 [2]. He used a metallic endoprosthesis to restore intestinal patency in a patient with an inoperable rectal carcinoma. Tejero et al. described the use of an enteral stent in a patient with an operable recital carcinoma, although with concomitant obstruction [3]. It was the first application of an enteral stent to decompress the intestine and to prepare the patient for surgical resection.

Modern prostheses are made of light metal alloys, come in various sizes and have different physical properties. Reviewing 88 clinical trials 92% stent implantations were successful, accompanied by an intestinal decompression within 72 hours [5].

The development of endoscopic techniques and technological progress in the construction permitted the use of nickel titanium alloy (nitinol) stents. A characteristic fea-

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ture of nitinol stents is the possibility to obtain various degrees of dilatation, thus allowing their use both in the upper (oesophagus, stomach and duodenum) and lower gastrointestinal tract (large intestine). Beside the material used, stets also differ in construction.

OBJECTIVES

The aim of this study is to assess the efficacy and safety of the implantation of our own developed self-expanding enteral stent in patients with a cancer-induced obstruction of the left half of the colon due to an ovarian carcinoma.

MATERIAL AND METHODS

Between 2012 and 2014 thirteen patients with inoperable left half colon obstruction and rectum caused by a compression due to ovarian carcinoma were classify for examinations (Tab. 1). A CT scan permitted to locate the obstruction and plan the length of the stent. General Electric LightSpeed Ultra CT Scanner was used by Diagnostic Department for examination. The results were evaluated by experienced radiologists. The study included patients with inoperative ovarian cancer which causes obstruction on one level in an episode of distal segment of rectal colon. Patients revealing symptoms of a multilevel enteral obstruction were excluded from the trial.

The Bioethics Committee at the Medical University of Warsaw approved the stents for implantation (KB 42/2012).

Our measurements of the neoplasm's stricture on the basis of a CT scan prior to surgery and a comparison of its dimensions with a histopathological analysis indicated that our stent should cover only the internal length of the neoplasm. This is an innovative approach, as classical enteral stents, besides the main tube expanding the neoplasm, also feature flared distal and proximal ends, distinctly exceeding the lumen of the malignancy. They are part of the stent's anti-migratory system. They drift in the healthy lumen of the intestine irritating and damaging the mucous membrane of the distal intestine and, after laxation, also the intestine upstream of the stricture.

For this reason, our stent lacks these anti-migratory flared ends. However, the lack of such system may expose the stent for more frequent migrations. For this reason, we designed a proprietary and unprecedented system of hooks ensuring a permanent anchoring of the stent in the neoplasm's mass. They are located in the central section, on the facing sides. The length of the hooks was designed to prevent the risk of an intestinal perforation, while maintaining the stent securely in the location of the obstruction. On the basis of a perioperative assessment of the intestine's thickness in the location of the neoplasm in 50 patients, it was determined, that the minimum thickness varied between 5 mm and 4.7 cm. The developed stent's hooks were

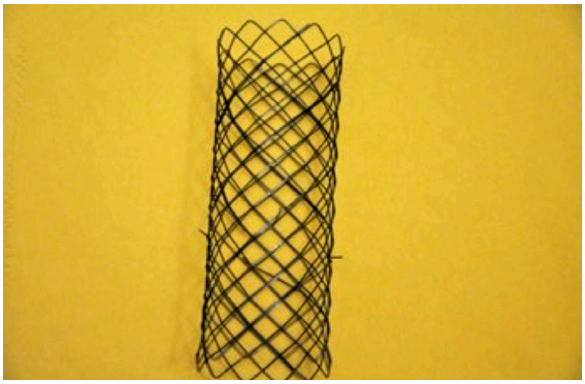

Figure 1. Stent construction

3 mm in length. This is a safe length, not causing perforations and sufficient to ensure its secure anchoring in the intestine's wall (Fig. 1)

To implant safely the stent in the obstruction it must be clearly seen in X-rays. The visibility were tested by taking X-ray images of various weave densities stents (Fig. 2). Since the implantation of a stent in the lumen of the bowel is a dynamic process with a constantly changing background resulting from the bowel's motility and respiratory movements, the stent's visibility was enhanced by installing markers with more enhanced X-ray visibility at the distal and proximal ends.

The examination was conducted in Endoscopic Laboratory of the Department of Metabolic Diseases and Gastroenterology Institute and Nutrition in Warsaw by experienced team using the TIMKO Ziehm solo X-ray model. The procedure was performed in sedation. Intestinal obstruction, advanced ovarian cancer and comorbidities eligible patients for anesthesia stage IV ASA. Endoscopic procedure begins with the placing the colonoscopy depending on stenosis localization. The tool is placed with minimal insufflation of air near the stenosis. Through the working channels rigid guide searching tumor stenosis is carried. Along the guide the catheter is assumed beyond the tumor and the contrast is given to ensure right direction of implantation and lack of perforation (Fig. 1–3). Subsequently the length of the stent is confirmed by measuring the distance between the tumor distal edge and colonoscopy driven as close as possible to the tumor. Savary-Gilliard dilators are placed along the guide through the channel with the catheter. Extension is carried out to reach the tumor diameter for easily carrying out the set beyond stenosis. The next step is the intestinal stent implantation. The first step is to placed the set beyond tumor under fluoroscopic control. The balloon on the end of the stent is expanded, filled with contrast and changes the position towards the tumor. The deformation of the balloon is a signal of the distal stenosis position and is also the moment of releasing the stent. The procedure is

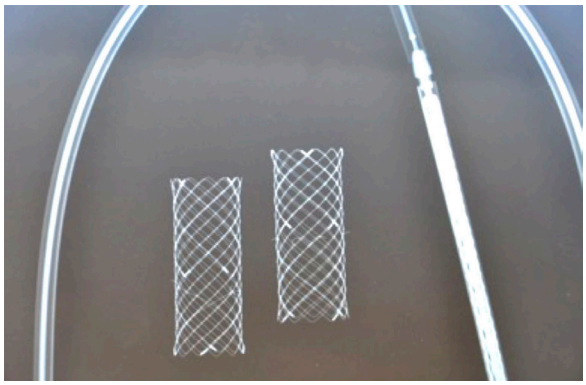

Figure 2. Visibility of stent in X-rays

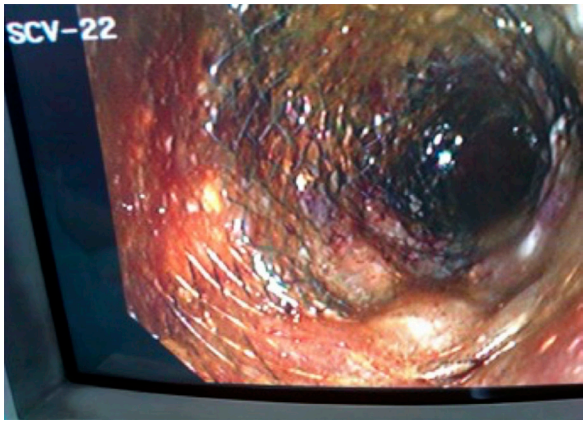

Figure 3. Implanted stent

performed under radiological control so the position of the stent can be observed. The efficacy of the stent's implantation was assessed postoperatively during a colonoscopy (Fig. 3). The restoration of the gastrointestinal tract's patency was assessed over a 24-hour period, based on physical examination and case history. Three patients were subjected to a 3-month observation, 7 patients to a 5-month observation, and 3 patients to a 12-month observation. The length of the observation depended of the patient's general condition. Upon completion of implantation balloon is emptied and the entire set is removed from the intestinal lumen.

RESULTS

Nine stents were implanted in the sigmoid and rectosigmoid sections; 4 stents were implanted in the externally compressed rectum. All patients were evaluated for the effectiveness of decompression obstruction 12 and 24 hours after the treatment. In addition to the physical examination the X-ray scan of the abdomen was performed to determine the degree of radiological obstruction reduction and assess the position of the implanted stent. The restoration of patency of the gastrointestinal tract and the correct position of the stent was consider as good result. A single implanted stent's migration was observed. The patient underwent a colostomy. The decompression of the obstruction of the gastrointestinal tract was obtained in 11 patients (85%) after the first stent implantation. In one case 2 stents were implanted due to an insufficient coverage of the stricture. Partial resolution of symptoms and withholding of stool was an indication for repeating the treatment during which a second stent was implanted with good clinical effect.

DISCUSSION

The cause of intestinal obstruction in the ovarian cancer is tumor oppressive intestinal lumen or tumor spread to the peritoneum causing functional impairment of motor skills due to the infiltration of the mesentery and running her nerves associated with motor activity. It is estimated, that in the case of a colorectal cancer, obstruction occurs in 10% to 28% of cases, and during the treatment of an ovarian carcinoma, it occurs in 20% to 50% of patients [1–3]. In patients with advanced ovarian carcinoma, enteral obstruction is an insidious process developing over weeks and yielding to a spontaneous remission under therapy between successive obstructive interludes. This is the most frequent form of the so-called enteral sub-obstruction, and it is caused by multifocal metastases to the colon wall. Local forms of advanced ovarian cancer are rare and most frequently located in the minor pelvis, where the pressure of the neoplastic mass compresses the sigmoid or the rectum. Previous procedures consisted in a surgical opening of a stoma above the obstruction. For a patient with a advanced ovarian carcinoma, despite being performed due to vital indications, it remains a major physical handicap, very often leading to death during the postoperative period. Surgical treatment is recommended only for patients with an obvious impediment, visible in a CT scan, and inaccessible for en endoscopic prosthesis. Several control trials focus on the role of endoscopic prosthesis insertion in the intestinal lumen as palliative treatment of an obstruction caused by a regional carcinoma recurrence and the ovarian cancer in particular [4–7]. Contrary to other indications regarding colorectal, stomach and esophageal cancer, in the case of ovarian carcinoma, the insertion of enteral prostheses is a procedure marked with a high rate of technical success, reaching between 78.8% and 100%, as well as a clinical efficacy factor between 83% and 100%. [8, 9]. When the clinical success factor is concerned, it was irrelevant if the obstruction was due to an infiltration of the primary neoplasm, or its metastasis to the minor pelvis (carcinomatosis) [10, 11]. Classic enteral stents were first used in 2009. On the basis of our own experience regarding the implantation of stents due to a carcinoma of the large intestine, we decided to develop our own enteral stent. In 2011 the proces begun and the manufacturer of the first Polish enteral stent was the Balton

company. The increasing number of patients with an gastrointestinal tract obstruction and unsatisfactory surgery results resulted in the introduction of the lightly invasive endoscopic technique to restore patency in strictures. When developing our own stent, we audited the design of stents from leading manufacturers worldwide. The goal was to use the best materials and to eliminate the shortcomings of stents available on Polish market. The most frequent complication in stricture stenting is migration. It occurs in 4.4% to 11.8% of cases. In our material we dealt with one migration that is 7.7%. The migration was due to an excessive dilatation of the neoplasm's lumen with a Savary-Gilliard Dilator device. The stent achieves its full expansion after 24 hours and then it is fully anchored in the neoplasm's mass. The second complication which occurred after 4 months, was an outgrowth of the neoplasm beyond the upper edge of the stent and a subsequent stricture of the intestine's lumen. In this case we implanted an additional stent above the first one covering the neoplasm's mass. This single point rectal stricture was due to peritoneal metastasis. Until now, such diagnosis was a contraindication for a stent implant. However, a review of current texts shows that stenting is an acceptable solution in such case [12, 13].

The main use of stent was a cancer-induced obstruction due to a colorectal carcinoma. In this cases, the stent was affixed in the narrowed, solid mass of the neoplasm. It appears that a healthy bowel wall or muscosa externally pressed positions the stent correctly in the lumen. One stent migrated. The reason was its very low positioning in the rectal lumen caused by a mechanical failure of the stent's expanding system. The female patient was qualified for a stomy. The extent of a neoplasm's restriction of the enteral lumen is easy to assess on the basis of a CT scan, as well as during surgery in the case of a colorectal carcinoma. In the case of an externally applied pressure, when the mucous membrane of the bowel is regular, the extent will not be visible in an endoscopy during the procedure. In this case, the best solution is to implant the stent under CT control. We have performed such a procedure following the incomplete coverage of the stricture during the classical procedure. The additional stent was implanted above the one previously implanted (Fig. 3). In conclusion, the endoscopic stent implantation in a cancer-induced obstruction due to a gynecological carcinoma is very effective. A palliative stenting for the treatment of obstructions is a good alternative to surgical treatment.

CONCLUSIONS

The implantation of our own developed, self-expanding stent is effective and safe

The implantation of a stent in patients with an inoperable ovarian cancer causing an obstruction of the gastrointestinal tract is an effective procedure limiting postoperative complications and improving life comfort by avoiding stoma.

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