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# Evaluation of the Effect of Homemade Double Perfusion Cannula on Patients with Total Gastrectomy\*

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**ABSTRACT** **Objective:** At present, the abdominal drainage of postoperative total gastrectomy is mostly used the common drainage tube. However the prevent usage of double perfusion cannula in patients with total gastrectomy is controversial as its therapeutic value is uncertain. The aim of the study was to discuss the effect of the use of double perfusion cannula on patients with total gastrectomy. **Methods:** one hundred patients with gastrectomy who were operated in our hospital from 09/2011 to 09/2013 were divided into the experimental group and control group. Two double perfusion cannulas were used in the experimental group and two common cannulas in control group. We compared the use of antipyretic, average drainage per day, incidence of abdominal infection, time of cannula usage, average length of hospitalization and incidence of severe complications in two groups. **Results:** In control group, one patient had duodenal stump leakage and intra-abdominal hemorrhage; one incision infection and three ascites. In experimental group, one patient had stomach-esophagus anastomotic leakage and intra-abdominal hemorrhage. The mean time of use of antipyretic in 7 post-operative days was  $(1.85 \pm 1.10)$ d. The mean drainage per day was  $(145.50 \pm 15.45)$ ml. The mean length of hospitalization was  $(13.98 \pm 2.09)$ d. The above results had significant differences. But there were no significant differences in the average time of cannulas usage  $(9.90 \pm 2.75)$ d and incidence of anastomotic leakage. **Conclusion:** The prevent usage of double perfusion cannula in patients with total gastrectomy could relieve the high-temperature caused by ascites, shorten the length of hospitalization, prevent the abdominal infection. The prevent usage of double perfusion cannula could not decrease the incidence of severe complication, but it can be found and treated on time. Thus the second operation is avoided and the use of double perfusion cannula should be proposed on the clinic.

**Key words:** Double Perfusion Cannula; Negative Pressure Drainage; Continuous irrigation; Total Gastrectomy

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## Introduction

Abdominal drainage is one of the most common and important essential technology in the abdominal surgery. The essence of most surgery is drainage. Nowadays abdominal drainage is still one of the most widely use and controversy technologies [1]. Sims first used the abdominal draft tube after gynecologic operation in 19th century. And since then surgeons use draft tubes after abdominal operations as a routine [2]. There are many complications after total gastrectomy and patients recover slowly [3,4]. The usage of draft tube can prevent ascites [5,6], the abdominal infection and discover and treat the postoperative abdominal hemorrhage and stomach-esophagus anastomotic leakage on time [7]. However, the common tube is often obstructed by necrotic tissue and hardly drain clearly. Now the condition of double perfusion cannula usage in the general surgery department of our hospital is reported as following.

## 1 Materials and methods

### 1.1 Clinical data

There were 100 patients with gastrectomy operated in our hospital from 2011/09 to 2013/09. Fifty of the patients were in the experimental group while others in the control group. The average age of the experimental group is  $63.25 \pm 10.25$  years and that of the control group is  $66.25 \pm 12.25$  years. There was no significant difference. It was confirmed to be gastric adenocarcinoma by endoscopic biopsy before the operation. And there were 19 patients with low-differentiated adenocarcinoma, 37 patients with medium-differentiated adenocarcinoma, 40 patients with high-differentiated adenocarcinoma and 4 patients with senior class CIN accompanying no typical hyperplasia. All patients were operated by the same doctor. And we used D2 total gastrectomy and stomach-intestine anastomoses.

### 1.2 The make of double perfusion cannula

The tube includes three parts: water inlet, negative pressure

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attracting tube and outer thimble. Water inlet is 10-size red urinary catheter and its head part is fixed to outer thimble by 7-size wire. The outer thimble is a common juncture tube, the wall is punched by puncher and the head is closed. The coating tube connecting red urinary catheter is disinfected and packed for reservation. Negative pressure attracting tube is sheared from transfusion apparatus. And it is placed inside the outer thimble.

### 1.3 Methods

Patients in the trial group were given two double perfusion cannulas which were placed at the left side of the spleen and the right side of the stomach-esophagus anastomoses, respectively. The negative pressure of double perfusion cannulas was (2.0-2.5) Kpa and the drop velocity of normal saline was about 60 drip per minute. The fluid intake per day and the color of rinse solution were recorded. Everyday we move the inside tube 2 to 3 times in order to prevent obstruction. The liquid food was feed after the patient exhausted. If the liquid was clear and less than 20ml on the second day, the tube could be changed to single tube (22-size silicone tube). And the procedure was easy because of the formation of sinus tract. The single tube was pulled out on the next day. The patients in control group were placed two 26-size atex drainage tubings at the same places. And the tube was connected to the drainage bag. We pulled out the tube at the same condition of that of the trial group. The change of patients' temperature and the in-

cidence of abdominal infection were recorded at two groups.

## 2 Results

One patient had stomach esophagus anastomotic leakage merging in incision infection in the trial group. The leakage was found on the 6th day after the operation and the complication was confirmed by CT. The place of double perfusion cannula is reasonable. After two months of persistent peritoneal lavage and strict fasting, the patient left hospital. In the control group, one patient had duodenal stump leakage merging in intra-abdominal hemorrhage. It was discovered because the patient had severe abdominal pain and confirmed by CT. We performed the second surgery to stop bleeding and douched the enterocoelia. And we put two double perfusion cannulas for persistent peritoneal lavage. After 54 days of conservative treatment, the patient was discharged. One case had incision infection and three ascites. Comparing to the experiment group, the use of antipyretic in the control group was higher within 7 days after the operation. The average daily drainage volume of the trail group is more than that of the control group. And there were significant differences. The mean extubation time of the trail group is less slightly than that of the control group but there was no significant difference. There was no difference of the incidence of anastomotic fistula between two groups. The results were showed in the following tables.

Table 1 The recovery condition of postoperative total gastrectomy with two groups

	The average number of using antipyretic	The average daily drainage volume(ml/d)	The mean extubation time (d)	Postoperative hospital stay(d)
control group	2.15± 1.41	85.46± 16.75	9.26± 1.56	11.20± 2.05
trail group	1.85± 1.10	145.50± 15.45	9.90± 2.75	13.98± 2.09
t	2.56	3.01	1.15	2.89
p	<0.05	<0.05	>0.05	< 0.05

Table 2 The postoperative complication rate

	The number of ascites	occurring rate(%)	the number of anastomotic fistul
control group(n=50)	3	6.0	1
control group(n=50)	1	2.0	1
$\chi^2$	1.01		

## 3 Discussions

### 3.1 the effect of a double perfusion cannula

The persistent vacuum sealing drainage technology can remove bacterial secretion and exudation and reduce bacterium in infected lacuna. That can alleviate the local inflammation. As studies in the literature have reported [8-9], the persistent vacuum sealing drainage with double perfusion cannula can alleviate the local inflammation and induce the angiogenesis by promoting the proliferation of fibroblasts and capillary endothelial cells and secretion of vascular endothelial growth factor and platelet derived

growth factor. So accelerate the formation of granulation tissue. To douche the spill of digestive juice with normal saline continuously can dilute the corrosion of bile, intestinal juice and pancreatic juice to abdominal organs. Comparing to the control group, patients in the experimental group used less antipyretic and that showed using double perfusion cannula can drain completely; cool hypertemperature caused by absorbing ascites and then relieve their pain.

### 3.2 The advantage of using double perfusion cannula

(1) Draining thoroughly and no easily obstructing. Comparing to the distal gastrectomy, the total gastrectomy has a larger surgi-

cal field, more complicated procedure and longer operation time<sup>[10,11]</sup>. That can cause severe complications easily such as abdominal infection, intestinal fistula. These complications not only delay wound healing, prolong the hospitalization, increase the expense but also cause patient's physiological imbalance, develop to multiple organ dysfunction and cause death of the patient if the condition deteriorates. As a result, most surgeons will put the abdominal drainage after surgeries. The monotron drainage usually cause the increase of fluid viscosity and obstructed drainage because of necrotic tissues and blood clot. We find 18 cases in the control group are obstructed by necrotic tissues and that may be one reason of hypertemperature.

The outer thimble of double perfusion cannula plays a role of support, collapses uneasily and is easy to form a fistula. The former part of the out tube is closed. That can avoid the obstruction of the drainage tube because the tissue is attracted by the negative pressure. The holes on the wall could expand drainage scope, produce the negative pressure around the tube and promote formation of the complete fistula. When there is no fluid in the enterocoelia, the attractive tube drains the air coming through the gaps of the out tube because the air can come though the gap between out and inside tubes freely. That can avoid the damage of the tissue around the tube caused by the negative pressure. 0.9% NS is injected continuously via the urinary catheter in order to avoid the obstruction of the stuff such as mucus, protein-associated substance.

(2) to find anastomotic leakage and intra-abdominal hemorrhage early<sup>[12]</sup>. There was one case in the trial group with yellow merging in reside drainage fluid in 6th after the operation. We found it timely and treat properly. We could deduce the hemorrhage spot and decide if the laparotomy is necessary when use the double perfusion cannula. When we use the common drainage tube, it is difficult for us to judge where is blood from because the tube often is blocked by the clot and the necrotic tissue.

(3) the effect of treating pancreatic exudation is reliable. The incidence of pancreatic fistula is 17.4% after the radical gastrectomy<sup>[13-14]</sup>. The double perfusion cannula can dilute the pancreatic fluid and lessen the corrosion to the tissue around the tube which can promote the healing of the incision.

(4) less skin exudates and the times of dressing changes. The seroperitoneum outflows from gaps on the junction of the drainage tube and the skin. That will cause deamocutous swelling and increase the chance of wound infection. The double perfusion cannula drains actively and rarely damps dressings. The use of the tube reduces unnecessary dressing change.

### 3.3 Problems

(1) the limit of patients' movements. The patient's activity is limit to some extent because of negative pressure attracting tube of double perfusion cannula. Although the pause of flushing will not increase any risk, it increases the nursing job of repeated tubing.

(2) to increase patients' physiological burden. Most of pa-

tients have physiological burdens for staying in bed for a long time and irritability.

According to our study, the advantages of using double perfusion cannula can be clearly realized, and known how to choose the appropriate patients to apply. It should be individual to use double perfusion cannula. For the aged<sup>[16]</sup>, we suggest the preventive put of the tube because the old patient has a bad nutritional status and potential risk of post-operation fistula<sup>[15,16]</sup>. During the surgery, we find edema of the gastrointestinal tract and its surrounding tissue in the patients with bad nutritional status, and put the double perfusion cannula as a routine in order to prevent anastomotic leakage. Although this method is not accepted by most scholars<sup>[17,18]</sup>, the increase of work is worth for easing patient's pain and even rescuing their lives for us. Therefore the use of double perfusion cannula should be proposed on the clinic. But after the application of double perfusion cannula, the management is rather complicated, which needs more care and must be examined by special doctors at regular intervals.

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## 自制滴水双套管持续负压引流技术应用于全胃切除术后的效果评价 \*

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**摘要 目的:**目前全胃切除术后患者腹腔引流多数是放置普通单管引流,然而术后预防性放置滴水双套管的价值还存在争议。现对滴水双套管应用于全胃切除术后腹腔引流的效果进行系统评价。**方法:**选取我院 2011 年 9 月-2013 年 9 月开腹全胃切除患者 100 例为研究对象,随机分为实验组和对照组,实验组术毕放置两根滴水双套管,左右各一根,对照组常规放置普通橡胶引流管两根,比较两组术后退热药物应用次数,平均每日引流量,腹腔感染发生率,置管时间,术后平均住院时间,严重并发症发生率。**结果:**对照组 50 例患者中,有 1 例出现十二指肠残端瘘合并腹腔出血。1 例切口感染,3 例腹腔积液。实验组 50 例中,有 1 例出现胃食管吻合口瘘并切口感染。术后前 7 天应用退热药物(体温超过 38.5 摄氏度时应用)的平均次数( $1.85 \pm 1.10$ )d,差异有统计学意义( $P < 0.05$ )。平均每日引流量( $145.50 \pm 15.45$ )ml,差异有统计学意义( $P < 0.05$ )。平均拔管时间( $9.90 \pm 2.75$ )d,但差异无统计学意义( $P > 0.05$ )。平均术后住院时间( $13.98 \pm 2.09$ )d,差异有统计学意义( $P < 0.05$ ),吻合口瘘发生率两组无差异。**结论:**对于全胃切除患者,术后预防性放置滴水双套管,可明显减轻术后腹腔积液产生的体温升高,缩短住院时间,有效防止腹腔感染的发生,虽不能降低严重并发症的发生率,但可以起到及时发现及时处理的作用,避免二次手术。值得在临床上推广。

**关键词:**滴水双套管;负压引流;持续冲洗;全胃切除术

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