

Measures against Problems with Peritoneal Drainage after Gastroenterological Surgery : Evaluation Based on 1-Year Surveillance

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ABSTRACT

Background : Spontaneous removal of the peritoneal drain or its retraction into the peritoneal cavity is rare but is likely to necessitate re-operation. In this study, we performed 1-year surveillance of problems related to peritoneal drains after gastroenterological surgery and evaluated measures to prevent them.

Patients and methods : A total of 443 gastroenterological operations were performed in our department from April 2005 through March 2006. We surveyed the patient's characteristics, the clinical course, and the rate of postoperative problems with peritoneal drainage.

Result : During this period, problems with peritoneal drainage occurred in 6 of 443 patients (1.4%) : the drain was removed spontaneously in 3 patients and retracted into the peritoneal cavity in the other 3 patients. Drain re-insertion by means of laparotomy was necessary in 3 of the 6 patients (50%).

Conclusion : Long-term drain retention due to postoperative complications and careless fixation during drain replacement increase drain-related problems. Important concepts in peritoneal drain fixation are tight fixation between the suture and the drain and the prevention of drain migration even with loosening of the suture. Moreover, the drains should be removed as early as possible, and if the drain should be re-fixed if it must be placed for 1 week or longer.

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Key words : peritoneal drain-related complications, gastroenterological surgery guideline for drain placement

INTRODUCTION

Peritoneal drainage should not be performed unless necessary after gastroenterological surgery. However, when the drain is inserted, the effort should be made to minimize problems with the drain. Peritoneal drains can dislodge or retract into the peritoneal cavity and necessitate re-operation¹. Also there is no standard technique for fixing the peritoneal drain in the skin^{2,3}. In this study, we performed a 1-year surveillance of problems related to

peritoneal drains after gastroenterological surgery and evaluated measures to prevent them.

PATIENTS AND METHODS

A total of 443 gastroenterological operations were performed in the Department of Gastroenterological Surgery, Daisan Hospital, The Jikei University School of Medicine, Tokyo, Japan, during the 1-year period from April 2005 through March 2006 (Table 1). We surveyed the patient's characteristics,

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Table 1. Gastroenterological operations performed at our department during the 1-year period of 2005

Operated organs	Cases
Esophagus	11
Gastroduodenal	87
Small intestine	24
Appendix	53
Colon	67
Rectum	56
Anus	22
Liver	21
Bile duct	5
Gallbladder	80
Pancreas	14
Spleen	3
Total	443

the clinical course, and the rate of the problems with peritoneal drainage after gastroenterological surgery. Penrose and Duple drains are often used in our department. Before this surveillance, drains were routinely placed if there were concerns about postoperative bleeding and anastomotic leakage after gastroenterological surgical procedures except uncomplicated cholecystectomy, appendectomy, and small intestine resection. Moreover, the drain was fixed to the skin with 2-0 nylon sutures by means of a cutting needle and 3 nonslip knots. The placement period of the

drain differed with the surgical procedure ; however. the drains were removed as early as possible.

RESULTS

Problems with peritoneal drainage occurred in 6 of 443 patients (1.4%) : The drain was removed spontaneously in 3 patients and retracted into the peritoneal cavity in the other 3 patients. The causes of these problems were loosening of the skin-fixation sutures in 5 patients and a drain tear in 1 patient. The drain was maintained for a prolonged period due to anastomotic insufficiency or postoperative complications, such as bile leakage, in 4 patients, which was caused by careless fixation during drain replacement in 2 of these patients. Of the 6 patients with drain problems, 3 patients (50%) required drain re-insertion by means of laparotomy, and the Risk Management Committee rated the risk level as 3b (accident that temporarily requires intensive treatment with operation, etc.) in all these patients (Table 2).

DISCUSSION

The results of this surveillance suggest that spontaneous removal of a peritoneal drain or its retraction into the peritoneal cavity leads to re-insertion and that long-term drain retention due to postoperative complications and careless fixation during drain

Table 2. Problems with peritoneal drainage during the 1-year period of 2005

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Operative procedure	Partial hepatectomy Cholecystectomy	Distal gastrectomy	PD*	Sigmoidectomy	SLAR**	Hepatectomy
Type of drain	Replaced Penrose	Penrose	Duple	Duple	Duple	Replaced neraton
Fixation	Suture-fixation	Suture-fixation	Suture-fixation	Suture-fixation	Fixation without suture ligation	Fixation without suture ligation
Position	Right subphrenic	Winslow	Right subphrenic	Anastomotic site	Anastomotic site	Right subphrenic
Retention days	35	1	3	9	34	16
Postoperative complications	Bile leakage	None	None	Leakage	Leakage	Bile leakage
Problem	Dislodgement***	Retraction****	Dislodgement	Dislodgement	Retraction	Retraction
Cause of problem	Loosening of the suture	Loosening of the suture	Loosening of the suture	Drain tear	Loosening of the suture	Loosening of the suture caused by fragile skin
Measures against problems	Observation	Re-insertion by laparotomy	Observation	Re-insertion without laparotomy	Re-insertion by laparotomy	Re-insertion by laparotomy

*PD: pancreatoduodenectomy, **SLAR: super low anterior resection, *** Dislodgement: Spontaneous removal, ****Retraction: Dropping into the peritoneal cavity

replacement increase drain-related problems.

As a basic principle of risk management, it is important to design a “safe system” that prevents accidents without special effort⁴. Both software and hardware must be renovated to design a “safe system.” Accidents do not decrease simply by urging the staff to be careful. Concerning software, we created manuals for procedures, such as “The Peritoneal Drain Fixation Method,” on the basis of surgeons’ opinions obtained with a questionnaire survey and a review of the literature⁵⁻⁸. We performed a questionnaire survey of all 12 surgeons in our department concerning “measures against problems concerning peritoneal drainage after gastroenterological surgery.” The text of the questionnaire was as follows:

Dear fellow members of the Department of Gastroenterological Surgery,

The Risk Management Committee has instructed us to evaluate safe methods for drain fixation and present conclusions regarding our department. The committee will use our responses to prepare a manual. We invite your opinions concerning such matters as patients who do not require drainage, drain types, open or closed drains, kinds of fixation suture, fixation methods, and time of drain removal.”

Completed questionnaires were received from all surgeons. Based on the questionnaire and a review of

the literature, the following manual for insertion of peritoneal drains was prepared.

1. Do not insert unnecessary drains.

Drains should not be routinely placed owing to concerns about postoperative bleeding and anastomotic leakage in gastrointestinal surgical procedures. However, drain placement is considered necessary for total gastrectomy, low anterior resection, hepatectomy, pancreatectomy, and operation for gastrointestinal perforation.

2. Remove the drain as soon as possible.

The drain should be removed as soon as the abnormalities in the amount and properties of the exudate resolve.

3. The length of the skin incision should be identical to the size of the drain.

4. The drain should be fixed to the skin by means of a round needle and 2-0 nylon suture, with 5 or more nonslip knots at 2 different places.

5. Leave 5 cm or more of the drain protruding past the skin.

6. Do not use safety pins.

7. If the drain must be placed for 1 week or longer, it should be re-fixed.

Drainage has disadvantages, such as retrograde infection, organ compression, and adhesion. Therefore, fixation between the drain and skin can be improved, and subcutaneous infection can be prevented



Fig. 1. We have developed a fixation device for the Duple drain, which is used frequently, to 1) strengthen fixation between the suture and the drain and 2) ensure the drain does not migrate even when the sutures loosen.

by avoiding the placement of unnecessary drains⁹, removing drains early if there is no problematic exudation¹⁰, and making the length of skin incision identical to the drain size. By fixing the drain to the skin with 2-0 nylon and ligating the suture with 5 or more nonslip knots, tearing of the drain and loosening of the suture can be prevented. The drain is fixed in 2 places by means of a round needle. If the part of the drain left outside the wound is short, the drain is likely to retract into the peritoneal cavity as the sutures loosen; therefore, at least 5 cm of the drain should be left outside of the body. Safety pins should be avoided because of the possibility of drain damage and infection. If the drain is maintained for 1 week or longer, the fixation sutures and the skin at the fixation site will be weakened; therefore, re-suturing for secure fixation is recommended. We have developed a fixation device for the Duple drain (Fig. 1), which is used frequently, to 1) strengthen fixation between the suture and the drain and 2) ensure the drain does not migrate even when the sutures loosen¹¹.

Instruction manuals of many drainage tubes state, "Do not directly apply a needle or suture to the drain tube," to prevent tearing of the drain due to inadequate suturing with a cutting needle or chronic tension of the suture. We believe that drain tears can be prevented through the use of a round needle, a fixation device, and central suture-fixation of the drainage tube.

In conclusion, important concepts in peritoneal drain fixation are tight fixation between the suture and the drain and the prevention of drain migration even with loosening of the suture. Moreover, the drains should be removed as early as possible, and if

the drain must be placed for 1 week or longer it should be re-fixed.

REFERENCES

1. Chousleb E, Szomstein S, Podkameni D, Soto F, Lomenzo E, Higa G, et al. Routine abdominal drains after laparoscopic Roux-en-Y gastric bypass: a retrospective review of 593 patients. *Obes Surg* 2004; 14: 1203-7.
2. O'Flynn P, Akhtar S. Effective securing of a drain. *Ann R Coll Surg Engl* 1999; 81: 418-9.
3. Powers ML, Myers RB, Bryant R, Aeschliman L, Anderson ME, Moore K, et al. A clinical report on the comparison of a drain/tube attachment device with conventional suture methods in securing percutaneous tubes and drains. *J Enterostomal Ther* 1988; 15: 206-9.
4. Voyles CR, Tucker RD. Education and engineering solutions for potential problems with laparoscopic monopolar electrosurgery. *Am J Surg* 1992; 164: 57-62.
5. Hormbrey E, Pandya A, Humzah D. Drain fixation made foolproof. *Ann R Coll Surg Engl* 2000; 82: 290-2.
6. Nancarrow JD, Beg MS, Murray DS. Wordsley technique of drain fixation. *Br J Plast Surg* 1999; 52: 326.
7. Heath DI. Drain fixation with a subcuticular stitch. *J R Coll Surg Edinb* 1987; 32: 242.
8. Dini GM, de Castilho HT, Ferreira LM. A simple technique to ensure drain fixation. *Plast Reconstr Surg* 2003; 112: 923-4.
9. Galandiuk S. To drain or not to drain. *Ann Surg* 2005; 241: 14-5.
10. Kawai M, Tani M, Terasawa H, Ina S, Hirono S, Nishioka R, et al. Early removal of prophylactic drains reduces the risk of intra-abdominal infections in patients with pancreatic head resection: prospective study for 104 consecutive patients. *Ann Surg* 2006; 244: 1-7.
11. Alperovich BI, Kazantsev NI. Device for abdominal drainage. *Khirurgiia (Mosk)* 1993; 5: 71-3.