



Original research

Laparoscopy-assisted combined resection for synchronous gastrointestinal multiple primary cancers



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HIGHLIGHTS

- Laparoscopy-assisted combined resection for SGMPC is feasible and safe.
- Laparoscopy-assisted combined resection for SGMPC is minimal invasive.
- Oncologic outcome laparoscopy-assisted combined resection for SGMPC is comparable.

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ABSTRACT

Background: Synchronous gastrointestinal multiple primary cancers (SGMPC) is infrequent. This study aimed to investigate the feasibility and outcomes of laparoscopy-assisted combined resection for SGMPC. **Material and methods:** We retrospectively reviewed 16 cases of SGMPC underwent either open or laparoscopy-assisted combined resection in the Third Affiliated Hospital of Sun Yat-sen University from Jan. 2005 to Jan. 2014.

Results: Sixteen cases contained synchronous colon cancers ($n = 10$), gastric and rectal cancer ($n = 5$), gastric and duodenal cancer ($n = 1$). Either laparoscopy-assisted or open procedure was performed. Compared with the open group, the laparoscopy group presented less blood loss (77.1 ± 46.3 ml vs. 145.0 ± 75.9 ml, $P = 0.047$) and shorter incision length (5.2 ± 0.7 cm vs. 16.4 ± 1.9 cm, $P = 0.000$), while no differences in operative time (228.3 ± 38.8 min vs. 188.8 ± 47.7 min, $P > 0.05$) and postoperative hospital stay (10.0 ± 3.4 days vs. 12.0 ± 4.8 days, $P > 0.05$). Two cases of postoperative complications occurred in the open group and one case of incision infection occurred in the laparoscopy one. Upon follow-up, 2 cases of open group (50.0%) and 8 cases of laparoscopy group (66.7%) were under status of disease free survival.

Conclusions: Laparoscopy-assisted combined resection for SGMPC is feasible, safe and effective.

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1. Introduction

Multiple primary cancers (MPC) is a rare condition defined as two or more different tumors synchronously or metachronously forming in the same individual [1]. Synchronous gastrointestinal multiple primary cancers (SGMPC) is even infrequent, and its surgical treatment remains poorly understood. Nowadays, laparoscopy-assisted surgery is widely applied in single primary gastrointestinal cancer. The outcomes appear better compared with those via the open approach [2–4]. However, whether laparoscopy-

assisted combined resection for SGMPC is still feasible and comparable to the open one is still elusive. In this study, we aimed to investigate the feasibility and outcomes of simultaneous laparoscopy-assisted combined resection for SGMPC. To our knowledge, so far our study contained maximum cases of SGMPC underwent laparoscopy surgery.

2. Materials and methods

2.1. Patient selection

The diagnostic criteria of multiple primary gastrointestinal cancers drawn up by Warren and Gates are as follows [5]: firstly,

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each gastrointestinal tumor should be histopathologically malignant; secondly, each tumor should be histologically different; thirdly, the possibility of metastasis of each tumor should be ruled out. The criterion for a tumor's being "synchronous" or "metachronous" is within 6 months or not.

From Jan. 2005 to Jan. 2014, 2565 cases of patients were diagnosed as primary gastrointestinal cancer in the Third Affiliated Hospital of Sun Yat-sen University. 27 cases of them were diagnosed as SGMPC. Among these 27 cases, 2 cases refused to accept surgery, 9 cases were diagnosed with synchronous sigmoid and rectal cancer and underwent single open or laparoscopy-assisted proctosigmoidectomy, while the other 16 cases underwent simultaneous combined resection for cancers. We retrospectively reviewed records of these 16 cases, containing 4 cases of open resection and 12 cases of laparoscopy-assisted combined resection.

2.2. Data collection

Patient demographics, clinical history, laboratory data, imaging results and surgery data were obtained through review of computerized medical records. SGMPC were diagnosed by combination of gastrointestinal endoscopy, biopsy and CT scan of abdomen. Pre-operative TNM staging revealed 4 cases of Stage II, 11 cases of Stage III and 1 case of Stage IV (TNM stage was indentified according to the worse one of the multiple primary cancers). The main outcome measures contained operative time, blood loss, postoperative morbidity, postoperative hospital stay and mortality.

2.3. Follow-up

Follow-up was carried out at every 3 months in the first two years postoperatively, 6 months in the third year and 12 months later, containing contents of history collecting, physical examination, laboratory and imaging tests. Outpatient follow-up, E-mail or telephone survey were conducted to collect follow-up status. The last follow-up was finished in Mar. 2014.

2.4. Statistical analyses

Continuous data were expressed as mean \pm SD and compared with Student's *t* test. Categorical data were expressed as frequency

and compared with chi-square test or fisher exact test. All P-values were two-sided, and the statistical significant level was 0.05. Statistical analyses were conducted using the SPSS software package version 11.0 (Chicago, IL, United States).

2.5. Operative procedure

We studied details of laparoscopy-assisted combined resection for SGMPC. Different procedures of laparoscopy-assisted combined resection were performed according to the location of SGMPC (Table 1). Here, we took laparoscopy-assisted combined distal gastrectomy and low anterior resection for example, to describe the brief procedure as follows.

The operation was performed under general anesthesia. The patient was firstly placed in lithotomy position to finish the low anterior resection. A Veress needle was used to establish pneumoperitoneum and the intra-abdominal pressure was maintained at the level of 14 mmHg. A 10 mm trocar (A) was placed below the umbilicus for a 30-degree telescope and another three trocars (B 12 mm, C 5 mm, D 5 mm) were placed for manipulation at the McBurney's point, left and right lateral sides of the rectus abdominis at the level of umbilicus respectively. The surgeons and monitor were positioned as shown in Fig. 1. The sigmoid mesocolon and mesorectum were dissected along the inner side of ureter by harmonic scalpel. The vessel and lymphatic were ligated at the root of the inferior mesenteric vessel with polymer clips, and the distal rectum was transected intracorporeally with a 60 mm laparoscopic linear stapler.

Then the patient was turned into Trendelenburg position and another trocar (E 12 mm) was placed at the crossing point of the left costal margin and anterior axillary line to complete the lymph node dissection and distal gastrectomy. The surgeons and monitor changed positions as shown in Fig. 2. Firstly, the greater omentum, together with the frontal layer of transverse mesocolon, pancreatic capsule and No.4 lymph nodes were dissected from the splenic flexure to hepatic flexure. The left and right gastroepiploic vessels were ligated and No.6 lymph nodes were dissected simultaneously. Then the hepatoduodenal ligament and No.12 lymph nodes were dissected. Afterwards, the right gastric vessel and left gastric vessel were ligated gradually, together with the dissection of No.5, No.7, No.8 and No.9 lymph nodes respectively. After dissection of No.1

Table 1
Operative procedure and data.

Case	Tumor location ^a	Pre-operative TNM staging	Operative procedure				
			Method ^b	Resection ^c	Anastomosis ^d	Operative time (min)	Blood loss (ml)
1	GC + RC	II	O	DG + LAR	Stapler, extra	245	250
2	IC + RC	II	O	RH + LAR	Stapler, extra	160	100
3	HFC + RC	III	L	RH + LAR	Stapler, extra	245	100
4	HFC + RC	II	L	RH + LAR	Stapler, extra	230	30
5	GC + RC	III	O	DG + LAR	Stapler, extra	210	150
6	IC + RC	III	L	RH + LAR	Stapler, extra	215	100
7	SFC + RC	III	L	LH + LAR	Stapler, extra	205	75
8	GC + RC	III	L	DG + LAR	Stapler, extra	260	60
9	HFC + RC	III	O	RH + LAR	Stapler, extra	140	80
10	GC + RC	III	L	DG + LAR	Stapler, extra	255	80
11	SFC + RC	II	L	LH + LAR	Stapler, extra	250	50
12	HFC + RC	IV	L	RH + LAR	Stapler, extra	195	100
13	GC + RC	III	L	DG + LAR	Stapler, extra	245	30
14	GC + DC	III	L	DG + PD	Stapler, extra	300	200
15	SFC + RC	III	L	LH + LAR	Stapler, extra	175	50
16	SFC + RC	III	L	LH + LAR	Stapler, extra	165	50

^a GC, gastric cancer; RC, rectal cancer; IC, ileocecal cancer; HFC, hepatic flexure colon cancer; SFC, splenic flexure colon cancer; DC, duodenal cancer.

^b O, open surgery; L, laparoscopy-assisted surgery.

^c DG, distal gastrectomy; LAR, low anterior resection; RH, right hemicolectomy; LH, left hemicolectomy; PD, pancreaticoduodenectomy.

^d extra, extra-corporeal anastomosis.

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