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〔Case Report〕

Successful staged surgery for advanced gastric carcinoma with severely impaired LV function and multivessel coronary artery disease: report of a case

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SUMMARY

A 74-year-old man with old myocardial infarction and congestive heart failure complained of dysphasia. Gastroscopic examination revealed type 3 advanced gastric carcinoma with esophageal invasion. Cardiac examination showed severely impaired left ventricular (LV) function and multivessel coronary artery disease (CAD). Percutaneous coronary intervention, utilizing coronary stent and balloon dilatation, did not improve LV function. Therefore, surgery was planned and performed in three stages. First, laparoscopic examination was performed to confirm cancer resectability. There was no peritoneal dissemination. Lavage cytology was negative. Second, coronary artery bypass grafting was performed, without extracorporeal circulation, using an intra-aortic balloon pump (IABP). Finally, total gastrectomy and D1+β lymph node dissection was performed under IABP on the 21st day after the bypass surgery. The curative potential of gastrectomy was B. The patient was discharged without complications on the 34th day after the gastric operation. He remains alive, without recurrence, 2 years after total gastrectomy. Positive staged treatment may provide the potential for safe and curative resection for aged patients with advanced carcinoma, severely impaired LV function, and multivessel CAD.

Key words: Gastric Carcinoma, Left Ventricular Dysfunction, Coronary Artery Disease, Total Gastrectomy

Ⅰ. Introduction

Noncardiac surgery is being used in an increasing number of aging patients with left ventricular (LV) dysfunction and/or coronary artery disease (CAD). The question of which noncardiac surgery strategy is optimal for these patients is still controversial. We report herein a case of advanced gastric carcinoma with severely impaired LV function and multivessel CAD

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that we treated successfully by means of three-staged surgery.

Ⅱ. Case

A 74-year-old man with a 7-year-old myocardial infarction (MI) and congestive heart failure complained of dysphasia, and went to a nearby hospital. Gastroscopic examination and gastrointestinal radiography revealed type 3 advanced gastric carcinoma invading the esophagus with oozy bleeding (Fig. 1-A). Cardiac function was assessed prior to gastric operation. Echocardiography (ECG) revealed severely impaired LV dysfunction, and coronary angiography (CAG) indicated stenosis at #1 (50%) and #2 (99%) in the right coronary artery (RCA), and #7 (90%) in the left coronary artery (LCA). Although percutaneous coronary intervention (PCI), including the placement of a coronary stent at #2 and balloon dilatation at #7, was carried out, LV dysfunction did not improve. The patient was referred to our hospital for a second opinion.

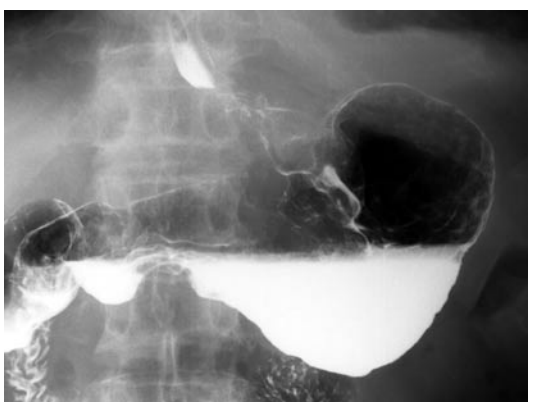

Fig. 1-A Gastrointestinal radiogram showed type 3 advanced gastric carcinoma with esophageal invasion in the upper body of the stomach.

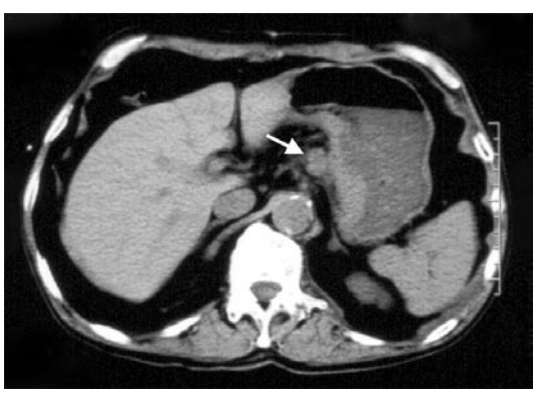

Fig. 1-B Computed tomogram showed thickening in the wall of the lesser curvature from the cardia to the body of stomach, and No. 3 lymph node swelling in the lesser curvature (white arrow).

Cardiac function was assessed again at our hospital, 2 months after PCI. ECG indicated that left ventricular diastolic diameter (LVDd) was 78.8 mm, and left ventricular ejection fraction (EF) was 20%. An occlusion was observed in the stent at #2, and strictures at #6 (75%) and #7 (50%) in the CAG. Left ventriculography (LVG) revealed that EF was 19% (Fig. 2). Based on preoperative examinations, gastric cancer was diagnosed as cT3 (SE), cN1, cH0, cP0, cM0, cStage IIIA (Fig. 1-B). Therefore, three-staged surgery, including revasculariza-

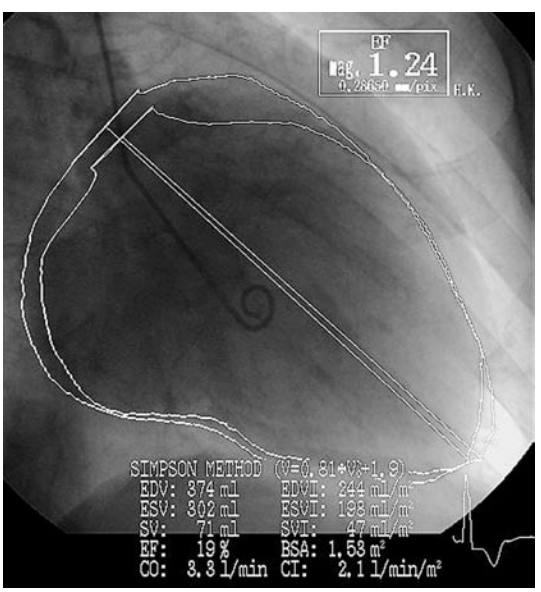

Fig. 2 Left ventriculogram. Left ventricular dilatation and diffuse hypokinesis was observed at the anterior wall; left ventricular ejection fraction and cardiac index were 19% and 2.11 l/min2, respectively, in left ventriculography prior to bypass surgery.

tion, was planned for curative resection, as well as for release of anemia and difficulty ingesting food. First, a laparoscopic examination was carried out under local anesthesia to confirm resectability of the gastric carcinoma. There was no peritoneal dissemination. Lavage cytology was negative. Next, after prophylactic insertion of an intra-aortic balloon pump (IABP), the left internal thoracic artery (LITA) was grafted to the left anterior descending coronary artery (LAD), without extracorporeal circulation. Graft surgery was completed without any problems. The cardiac examination after graft surgery showed LVDd 79.3 mm, EF 20% in ECG, patent LITA graft in CAG, and EF 16% in LVG. There were no cardiac events, and no other complications in the postoperative course. Although EF after CABG had not been improved as compared with preoperative EF, patency of the life-saving artery had been secured. Finally, total gastrectomy with D1+No.7, 8a and 9 lymph node dissection and Roux-en Y reconstruction was performed using IABP on the 21st postoperative day after the graft surgery, without hemodynamic instability or other cardiac event. Gastric cancer was diagnosed as pT2 (SS), pN2, sH0, sP0, sCY0, sM0, f Stage IIIA (tub2, PM(-), DM(-), INFβ, ly2, v3), and the curative potential of the present gastric resection (Curability) was B, according to the general rules of the Japanese Gastric Cancer Association. The patient was discharged on the 34th postoperative day. He remains alive, without recurrence, 2 years after total gastrectomy, although adjuvant chemotherapy has not been provided.

Ⅲ. Discussion

We had previously encountered 9 patients who had complicated multivessel CAD, as revealed in preoperative CAG, and who required abdominal surgery. Four of them underwent graft surgery or PCI prior to abdominal surgery (EF: 49-78%). However, we had never experienced a case involving abdominal surgery for multivessel CAD in which the LV dysfunction was as severe as in this case. Patients with severely impaired LV function and uncorrectable multivessel CAD are at high risk of cardiac morbidity and mortality after major noncardiac surgery[1,2]. However, the optimal approach for patients undergoing noncardiac surgery is controversial, and various strategies for cardiac risk assessment and risk reduction have been suggested[3,4].

LV dysfunction is considered an important predictor of peri- and postoperative cardiac outcomes. Accurate estimation of EF has become a standard procedure in cardiological decision-making in clinical practice. One reason for this, among many others, is that EF is directly correlated with survival, and inversely correlated with number of hospitalizations after MI[5-8]. Kay et al. reported that patients in the highest risk group (preoperative EF <30) had 2.7 times greater hospital mortality, 1.9 times greater hospital morbidity, and 6.7 times greater cardiac mortality, compared to the control group (preoperative EF ≥ 40)[9]. They suggested that EF was a valid predictor of mortality, morbidity and resource utilization, based on statistical analysis. Hausmann et al reported an overall operative mortality of 7.1% among 514 patients, with EF ranging from 10% to 30%. Mortality rose to 11.3% among patients with histories of more than two previous MIs[10]. Shiba et al. reported on the prognosis and predictors for mortality of chronic heart failure patients. There were significantly more deaths from various causes among patients with severe systolic LV dysfunction (EF $<25\%$) than among patients with satisfactory LV function. The 1- and 3-year mortality rates of patients with EF $<25\%$ were 15.0% and 33.0%, respectively. There was also higher mortality among patients with increased LVDd (≥ 60 mm) than among patients with

LVDd＜60 mm; the 1- and 3-year mortality rates were 11.4% and 28.2%, respectively[11]. In the present case, EF was less than 20% during the perioperative period. Gastric surgery may increase the risk of perioperative mortality and morbidity. However, the tumor in this case was an advanced carcinoma, with esophageal invasion, and was located in the upper part of the stomach. Hemorrhage from the tumor and difficulty in ingestion would probably have occurred as the tumor grew. Thus, surgery for gastric carcinoma was necessary in order to maintain quality of life.

It was our opinion that revascularization for multivessel CAD was necessary to safe performance of gastric surgery. Grafting the LITA to the LAD coronary artery is a treatment that is widely accepted as effective in prolonging life. However, the role of prophylactic coronary artery bypass grafting (CABG) procedures remains controversial, largely due to the absence of prospective randomized clinical trails [12]. Several large prospective and retrospective studies have demonstrated that when long-term and immediate benefits are considered together, the decision to perform CABG prior to a planned elective surgery is warranted[13,14]. A review of 1,600 patients in the Coronary Artery Surgery Study registry who underwent major noncardiac operations showed a mortality rate of 2.4% among patients with significant CAD and no prior bypass surgery; the mortality rate was significantly higher among patients who did not have CAD or those who had undergone a bypass[15]. Among 1961 patients undergoing higher-risk surgery, prior CABG was associated with fewer postoperative deaths and MIs, as compared with medically managed CAD[13].

IABP may provide myocardial protection and maintain hemodynamic stability for high-risk cardiac patients requiring noncardiac surgery initially[16-18]. Several studies have shown that perioperative mortality was significantly lower if the IABP was inserted prior to surgery. In CABG patients with EF＜25%, preoperative IABP insertion was associated with a reduction in 30-day mortality from 11.9% to 2.7%[19].

In the present case, the staged surgery, including single off-pump CABG and preoperative induced IABP, was performed successfully. Revascularization with bypass surgery should be proactively provided for aged patients with severely impaired LV function and multivessel CAD prior to abdominal surgery, in order to reduce the risk of complications and death. Positive staged treatment may provide the potential for safe and curative resection for patients such as these who also have advanced carcinoma.

要　旨

症例は74歳男性。陳旧性心筋梗塞及び慢性心不全で近医通院中，平成14年10月に嚥下困難を自覚し上部消化管内視鏡を施行したところ，食道浸潤を伴う胃噴門部３型胃癌を認めた。前医にて術前冠動脈造影検査（CAG）で認めた狭窄部にPCI（ステント及びバルーン）を施行するも開存率が悪く，EF29%であったため手術困難と判断。セカンドオピニオンを求め，平成15年１月精査加療目的に当科受診し入院となった。当院CAGにて#2ステント完全閉塞，#7～６の狭窄，EF19%であったため，胃癌手術に先行して冠動脈バイパス術CABGを施行する方針とした。CABGに先立ち，胃癌の術前病期及び根治度を調べるため腹腔鏡下試験開腹を施行し，腹膜播種のないことを確認した（P0, CY0）。２月18日非体外循環下CABG（１枝）施行。術後CAGにてEF16%であった。３月11日胃全摘＋D1＋βリンパ節郭清施行。術中はIABPにて循環補助を行ない，術当日はICU管理とした。術後に心エコーを施行しEF20%前後と診断されるも周術期合併症は特に見られず，第34病日自立歩行され退院となった。患者は術後２年が経過し，現在再発無く生存中である。最終診断は，tub2，pT2N2H0P0CY0M0 Stage IIIAで根治度Bであった。高度心機能障害を有する高齢な症例においても，積極的な段階的治療により安全に進行癌を治癒し得る可能性が示唆された。

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