

Gastric Cancer Occurred after Coronary Artery Bypass Grafting Using the Right Gastroepiploic Artery

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We recently encountered a rare case where gastric cancer developed in the long-term postoperative stage after coronary artery bypass grafting (CABG) using the right gastroepiploic artery (RGEA) and distal partial gastrectomy was performed to treat the cancer. The patient was a 64-year-old man. In November 2001, he underwent three-vessel CABG, involving bypassing between the right coronary artery (RCA) and the RGEA, to treat an old myocardial infarction. In May 2003, he was admitted to our hospital because of exacerbation of diabetes mellitus and anemia. Gastric endoscopy revealed gastric cancer affecting the pylorus. Preoperative abdominal angiography showed the RGEA graft remained well patent. In June 2003, he underwent distal partial gastrectomy and regional lymph node dissection. Because the RGEA had been freed adequately to the point of bifurcation of the gastroduodenal artery during the previous CABG, the RGEA graft was preserved during distal partial gastrectomy. When the RGEA is used for CABG, it seems advisable to free the RGEA adequately to a point of bifurcation of the gastroduodenal artery. If done so, regional lymph node dissection around the RGEA is easier to perform when gastric cancer has occurred in these cases, eventually reducing the risk for injury of the graft. Following CABG with the RGEA, it seems essential to perform periodical checks for gastric cancer to facilitate early detection of gastric cancer. The necessity of close follow-up of these cases is endorsed by the fact that healing of gastric cancer by endoscopic mucosal resection (EMR) is highly probable if the cancer is detected at early stages. (*Ann Thorac Cardiovasc Surg* 2004; 10: 255–8)

Key words: gastric cancer, coronary artery bypass grafting, right gastroepiploic artery

Introduction

Coronary artery bypass grafting (CABG) operation is constantly evolving. The increasing use of total arterial revascularization is mainly because of the superiority of arterial grafts over venous conduits for myocardial revascularization.¹ This has progressively led surgeons to commonly use the internal thoracic artery (ITA) and to increasingly use arterial grafts such as the gastroepiploic artery (GEA).² The latter arterial

conduit is also a pedicled graft allowing arterial revascularization of the right coronary artery (RCA).³ Long-term follow-up shows a good patency of this graft when used adequately. However, some investigators suggested possible onset of gastric cancer in the long-term postoperative stage after grafting the right GEA (RGEA), and cases developing gastric cancer which are difficult to treat surgically have been reported.⁴ We recently encountered a case where gastric cancer developed 18 months after CABG with RGEA and we treated the cancer by distal partial gastrectomy without injuring the RGEA graft. Considering that similar cases are likely to be seen among Japanese people who have a high incidence of gastric cancer, we report this case, with reference to the literature.

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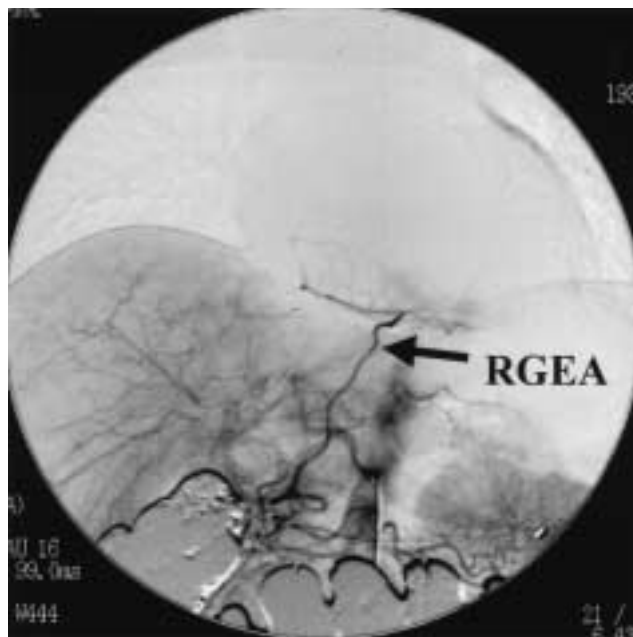


Fig. 1. Preoperative angiography of the truncus coeliacus. The RGEA graft to the RCA is well patent.

Case Report

The patient was a 64-year-old man. In November 2001, he underwent three-vessel CABG, involving bypassing between the left anterior descending branch (LAD) and the right ITA (RITA), between the obtuse marginal branch and the left ITA (LITA), and between the RCA and the RGEA, at another hospital to treat old myocardial infarction. In May 2003, he was admitted to the internal medicine clinic of our hospital because of exacerbation of diabetes mellitus (HbA_{1c}: 8.0%) and anemia (Hb: 7.7 g/dl). Gastric endoscopy, performed upon admission, revealed gastric cancer along the greater curvature of the pylorus. The patient was therefore referred to our department for surgery.

The biochemical test revealed slightly elevated serum potassium (K: 5.2 mEq/L), blood urea nitrogen (BUN: 28 mg/dl), and creatinine (Cr: 1.22 mg/dl). Abdominal CT scans revealed no sign of metastasis of cancer to other organs (e.g., the liver). It was confirmed that the RGEA graft had extended from the greater curvature of the pylorus beyond the anterior plane of the stomach, passing through the anterior plane of the left hepatic lobe and reaching the thoracic cavity. Preoperative angiography of the truncus coeliacus showed that the RGEA graft to the RCA remained well patent (Fig. 1).

On the basis of these findings, we judged it possible to perform distal partial gastrectomy in this case to treat gastric cancer of the pyloric region while preserving the RGEA graft. Surgery was performed on June 13, 2003.

Surgery was initiated with an epigastric transverse incision instead of an epigastric median incision, on the grounds that the latter might damage the RGEA graft. Adhesion was mild within the peritoneal cavity. It was confirmed that the RGEA graft extended from the greater curvature of the stomach through the area above the pylorus to the thoracic cavity, covered with small amounts of fat tissue (Fig. 2). Taking care to avoid damaging the RGEA graft, we performed distal partial gastrectomy, accompanied by regional lymph node dissection (D2). Because the RGEA had been freed adequately up to the point of bifurcation of the gastroduodenal artery during the previous CABG, regional lymph node dissection around the RGEA was easily performed. Billroth II procedure was used for reconstruction.

Histopathologically, the tumor, 4.2×3.0 cm in size, was rated as adenocarcinoma [pType IIC, pap, SM2, INF β , int, ly0, v2, n(-), PM(-), DM(-)] (Fig. 3). No metastasis was found in the dissected lymph node.

His postoperative course was uneventful. The patient was discharged on the 21st hospital day. At present, 10 months after surgery, the patient shows no sign of tumor recurrence. He is receiving drug therapy for cardiac infarction at a nearby clinic.

Discussion

The RGEA has been definitively recognized as a reliable conduit for CABG with excellent clinical results and long-term patency, in addition to LITA and RITA. There are many facilities at which total arterial revascularization are used in CABG, as a rule. The frequency of using RGEA is now high, and it is used as the arterial graft of first choice for RCA bypass surgery. In view of the report that the incidence of mediastinitis is high if bilateral ITA is used for two-vessel CABG,⁵⁾ CABG with unilateral ITA+RGEA will further increase to avoid such a complication.

However, as the use of RGEA increases, reports of cases developing various complications or cases requiring re-laparotomy have been made.^{6,7)} One disadvantage of the use of this artery as an in situ graft is the potential for injury in the event of subsequent abdominal procedures.⁸⁾ RGEA is often used as an in situ graft which is known to have a higher patency rate



Fig. 2. Intraoperative findings after dissection at the superior portion of the duodenum. The RGEA graft is covered with small amounts of fat tissue and extends from the greater curvature of the stomach to the thoracic cavity.

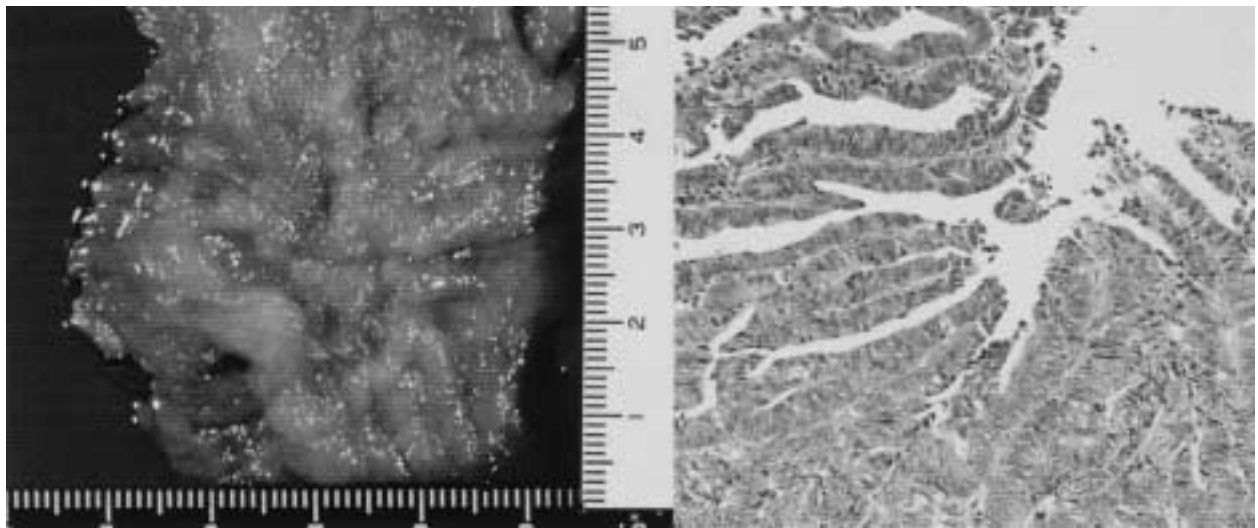


Fig. 3. Histopathologically, the tumor, 4.2x3.0 cm in size, is rated as adenocarcinoma [pType IIC, pap, SM2, INF β , int, ly0, v2, n(-), PM(-), DM(-)].

than when used as a free graft.⁹⁾ When used as an in situ graft, the RGEA is grafted either through the antegastric route or the retrogastric route. Most cardiac surgeons employ the antegastric route because it allows easier identification of any bleeding sites from the RGEA pedicle. However, a major disadvantage to this approach is that the RGEA may adhere to the greater omentum, or to the anterior abdominal wall, and it may be impossible to distinguish the RGEA pedicle from the surrounding fat tissue.¹⁰⁾ It seems essential to re-evaluate the arrangement of the RGEA before re-laparotomy is performed. When performing re-laparotomy, it is advisable to avoid an epigastric median incision. In the

present case, an epigastric transverse incision was employed.

The greatest problem with the use of RGEA is how to deal with the RGEA graft in cases where gastric cancer has developed following CABG. Because the RGEA used as an in situ graft involves fat tissue, some lymph nodes remain around the graft. However, since lymph flows from the periphery of RGEA towards the lymph nodes around the gastroduodenal artery, it is unlikely that tumor metastasizes from the greater curvature of the stomach to the lymph nodes around the RGEA which had been freed adequately. Therefore, in cases where RGEA has been adequately freed up to

the point of bifurcation of the gastroduodenal artery, D2 lymph node dissection is possible, while preserving the RGEA graft. Also in the present case, where RGEA had been freed adequately to its base during the first CABG operation, it was possible to perform D2 lymph node dissection, preserving the RGEA graft. If RGEA has not been freed up to the point of bifurcation of the gastroduodenal artery during the first operation, the tumor may metastasize to No. 4d and No. 6 lymph nodes. These lymph nodes are within the fat tissue surrounding the RGEA graft, and it is difficult to dissect these lymph nodes, while preserving the RGEA graft. In such case, it is advisable to perform gastrectomy, accompanied by resection of the RGEA, but surgical stress will be higher in these cases. Therefore, to permit smooth treatment of gastric cancer which has developed after CABG surgery, while preserving the RGEA graft and permitting regional lymph node dissection, it is useful to adequately free the RGEA up to the point of bifurcation of the gastroduodenal artery during CABG surgery.

Nowadays, thanks to advances in endoscopic technology, it is possible to achieve curing of gastric cancer by endoscopic mucosal resection (EMR) if the cancer is detected at early stages. Therefore, early detection of gastric cancer is quite important when following patients after CABG surgery with RGEA. These patients should be advised to receive periodical checks of gastric cancer. The necessity of close follow-up after CABG surgery with RGEA is particularly high for Japanese people who are more likely to develop gastric cancer than people in other countries.

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