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Case Report

Curative Resection Following Neoadjuvant Chemotherapy for Advanced Gastric Cancer With Preservation of a Right Gastroepiploic Artery Coronary Artery Bypass Graft: A Case Report

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Recently, the right gastroepiploic artery (RGEA) has been used in coronary artery bypass graft (CABG) as an alternative arterial graft. Because of the improvement of prognosis after CABG, malignant diseases are more common in older patients. However, there is a serious problem in patients with gastric cancer after CABG with RGEA graft. In these patients, an interruption of coronary blood supply through the RGEA may cause a life-threatening myocardial ischemia. Therefore, an appropriate strategy is very important to avoid risk while retaining the curability of the operation. We herein describe a 76-year-old Japanese man with advanced gastric cancer who underwent CABG using the RGEA. Abdominal computed tomography (CT) showed #6 lymph nodes (sub-pyloric lymph nodes) metastases surrounding the RGEA. We concluded that curative resection was impossible while preserving the RGEA and started combination chemotherapy using S-1 and cisplatin. After 2 courses of that, #6

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lymph nodes were reduced extremely. Thereafter the patient underwent distal gastrectomy with regional lymph node dissection around the RGEA without excision of the RGEA. Histologically, there were no metastases in #6 lymph nodes. Neoadjuvant chemotherapy may be effective for preserving the RGEA graft in a patient with advanced gastric cancer after CABG.

Key words: gastric cancer – CABG – RGEA bypass graft – neoadjuvant chemotherapy

The right gastroepiploic artery (RGEA) has been used in coronary artery bypass graft (CABG) surgery.[1,2] It is recognized as a reliable conduit with superior long-term patency.[3–5] The right gastroepiploic artery is mainly targeted to the right coronary artery because of the limitation of its length. According to the report of a Japanese association for coronary artery surgery, CABG was carried out in more than 0.1 million patients over a period of 7 years that ended in 2004, and the RGEA has been used in more than half of these patients.[6] After CABG for either triple-vessel or left main disease, patients have a 5-year actual survival rate of 92.9% and a cardiac death-free rate of 97.8%.[7] Long-term survival increases the opportunity for patients to develop malignant diseases. An increased incidence of gastric cancer after CABG with the use of RGEA has been reported.[6] In these patients, an interruption of coronary blood supply through the RGEA may cause a life-threatening myocardial ischemia. Therefore, an appropriate strategy is required to avoid risk while retaining the curative potential of the operation. We present a case of gastric cancer after CABG with the RGEA in which neoadjuvant chemotherapy led to curative operation while preserving the RGEA.

Case Report

The patient was a 76-year-old man. In 2007, he underwent three-vessel CABG for acute myocardial infarction, involving a bypass between the right coronary artery (RCA) and the RGEA, the left coronary artery (LCA) and the left internal thoracic artery, and using the great saphenous vein graft to the diagonal artery and the circumflex artery. In September 2012, he presented to a private hospital because of epigastralgia and bloody vomiting. By esophagogastroduodenoscopy, he was diagnosed to have an advanced gastric cancer located at pyloric antrum (Fig. 1) and was transferred to our hospital for gastrectomy. Apart from a carcinoembryonic antigen (CEA) value of 72.3 ng/mL, laboratory data were within normal limits. Abdominal computed tomography (CT) showed apparent #6 lymph nodes metastases surrounding the RGEA (Fig. 2) and the wall of antrum stained on contrast enhancement. Distant metastasis was not detected. Coronary angiography revealed severe stenosis of the RCA (100%) and LCA (100%) and left circumflex artery (100%), but all bypasses were well patent. The RGEA-RCA bypass perfused a large area of the inferoposterior wall of the heart (Fig. 3).

On the bases of these findings, it was obvious that the RGEA bypass was necessary in this patient. We judged it impossible to perform curative distal gastrectomy in this case while preserving the RGEA. Therefore, we opted to use chemotherapy as the initial treatment. The patient received a standard combined chemotherapy with oral administration of S1 (120 mg/d) for 21 days and injection of cisplatin (90 mg/body) on day 8.

After two courses of chemotherapy, #6 lymph nodes were almost disappeared in CT (Fig. 4). According to Response Evaluation Criteria in Solid Tumors guidelines, effectiveness judgment was partial response. Then we concluded it was possible to perform curative distal gastrectomy with preserving the RGEA. An epigastric median incision was made. The right gastroepiploic artery graft was easily recognized on the left lobe of the liver (Fig. 5). Papaverine hydrochloride was sprinkled around the RGEA to prevent vessel spasm. Its adhesion to the posterior aspect of the lesser curvature of the stomach was dissected and the RGEA was isolated using a vessel tape carefully. We dissected around the #6 lymph node station as much as we could. A distal gastrectomy with D2 lymph node dissection was performed. A Roux-en-Y procedure was used for reconstruction. In the event of right gastroepiploic artery injury, an external cardiac pacemaker was readied and a cardiac surgeon was on standby for bypass

Fig. 1 Gastrointestinal endoscopy showing advanced gastric cancer located at pyloric antrum.

operation. If #6 lymph nodes invaded RGEA, we intended to discontinue operation.

The pathological diagnosis was poorly differentiated adenocarcinoma and depth of tumor invasion was T4a (SE). There were no metastases of lymph node that included 5 lymph nodes in tissues around RGEA (#6). The clinical stage was determined as stage IB based on the Japanese Classification of Gastric Carcinoma (14th edition). No complications occurred during the operation. The patient was discharged on postoperative day 10. He received adjuvant chemotherapy with oral S1 (80 mg/d). At present, 13 months after surgery, there are no signs of recurrence of the gastric cancer.

Discussion

The frequency of using RGEA is now high, and it is used as the arterial graft of first choice for RCA bypass surgery with excellent clinical results and long-term patency. However, as the use of RGEA increases, reports of cases developing various complications or cases requiring relaparotomy have been made.[8,9] Gastric cancer is one of those. The curative potential of a gastrectomy depends on an adequate dissection of lymph nodes around the stomach, including #6 lymph nodes, as defined by the Japanese Gastric Cancer Association.[10–12] Standard D2 lymph node dissection is performed in most surgeries with curative intent in Japan.[13–15] A dissection of #6 lymph nodes is mandatory in a standard gastrectomy, with the exception of proximal gastrectomy for early gastric cancer located upper third of the stomach. However, successful gastrectomy after CABG using the RGEA depends on a good balance between safety and curability.

In our case, preoperative CT showed the enlargement of #6 lymph nodes surrounding RGEA, which strongly suggested metastases; and because of the angiography findings, blood flow from the RGEA graft was absolutely essential.

There were some reports in which preoperative coronary revascularization attained by either percutaneous coronary intervention or a redo CABG was shown to be crucial to ensure a successful gastrectomy.[16–18] These were useful strategies, but we selected chemotherapy first in spite of the risk that chemotherapy was not effective and we might lose the chance of curative resection. Clinical trials of adjuvant and neoadjuvant chemotherapy in gastric cancer have received increasing attention. The results of the Medical Research Council Adjuvant Gastric Infusional Chemotherapy trial have shown that perioperative chemotherapy (given both before and after surgery) can provide a significant survival benefit.[19] However, it has not been popular to perform neoadjuvant chemotherapy yet in Japan. On the other hand, the results of the S-1 plus cisplatin versus S-1 in RCT in the

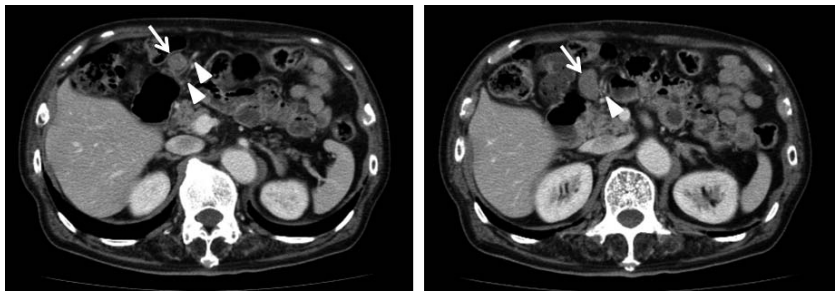

Fig. 2 Abdominal CT showed station 6 lymph node metastases (arrow) surrounding the RGEA graft (arrowhead).

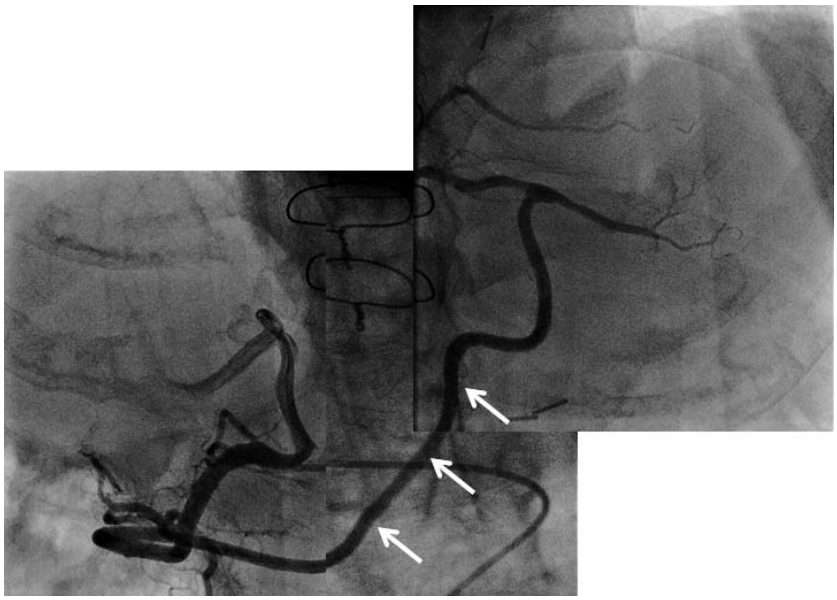

Fig. 3 Angiography showed the RGEA bypass graft (arrow) to RGEA was well patent.

treatment for stomach cancer (SPIRITS) trial showed that overall survival was better in patients with advanced gastric cancer treated with S1 and cisplatin than with S1 alone.[20] So we selected combination of S1 and cisplatin as neoadjuvant chemotherapy.

Fortunately in our case, after 2 courses of chemotherapy, #6 lymph nodes were reduced extremely. We decided to perform distal gastrectomy with preservation of RGEA graft. At operation, we dissected tissues surrounding the RGEA that involve #6 lymph nodes as much as we could. Histopathologically, no metastasis was found in the dissected #6 lymph nodes.

This is the first case of distal gastrectomy performed after neoadjuvant chemotherapy with preservation of the RGEA in a patient after CABG with RGEA. However, there is a question whether curative operation has done or not. Curative potential of this operation depends on the completeness of lymph nodes dissection around the RGEA graft. It is difficult to prove curability in this operation, but we tried complete dissection of lymph nodes around RGEA at its base carefully. Actually, there were 5 lymph nodes in tissues surrounding the RGEA, in which there was no metastases. Resection of the RGEA requires an additional alternative graft, which makes the operation more complicated and results in prolongation of the procedure. Moreover, an alternative graft may itself cause lethal complications. So this strategy may be a good option for the patient with advanced gastric cancer after CABG with RGEA.

On the other hand, if early detection is done, the patient may receive a less extensive operation such as endoscopic treatment. So, routine esophagogastroduodenectomy should be considered before

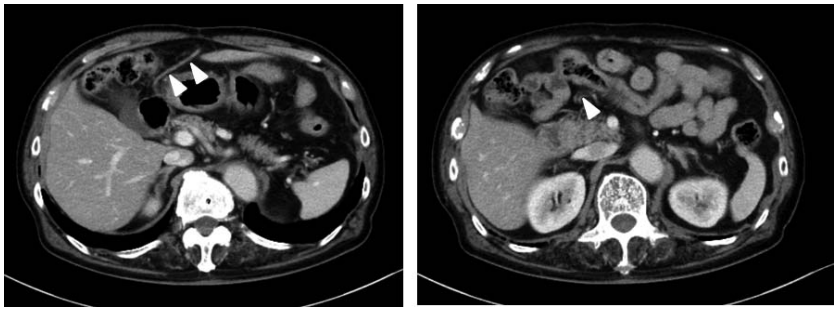

Fig. 4 After 2 courses of chemotherapy, the station 6 lymph nodes had almost disappeared from around the RGEA graft (arrowhead).

Fig. 5 Intraoperative view of the RGEA. It was easily recognized on the left lobe of the liver, although it was adherent to the posterior aspect of the lesser curvature of the stomach.

CABG operation, except in cases of emergency. After CABG, frequent examination is important to detect gastric cancer in its early stages. Furthermore, after CABG with RGEA, patient should be examined for Helicobacter pylori infection, which is one of the main causes of gastric cancer.[21] Disinfecting treatment may be valuable in patients with infection to prevent gastric cancer.

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