Two-stage Minimally Invasive Direct Coronary Artery Bypass Grafting in a Cancer Patient: LITA-LAD Bypass and Concomitant Transabdominal GEA-PD Bypass and Right-sided Colectomy

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A patient who had previously undergone coronary artery bypass grafting presented to our institution with severe coronary insufficiency and colon cancer. We performed two-stage minimally invasive direct coronary artery bypass grafting and simultaneous colectomy. The operative technique is detailed, and justification of the two-stage procedure and simultaneous approach in such patients is discussed.

KEY WORDS: simultaneous operation, MIDCAB, AAA, redo CAB, colectomy

I. Introduction

Various combined procedures are performed in cardiovascular surgery. Coronary artery bypass grafting (CABG), valve surgery, carotid endarterectomy,\(^1\) and abdominal aortic aneurysm (AAA) repair have all been done in different combinations of two procedures at a time with variable outcomes.\(^2\) However, to the best of our knowledge, simultaneous minimally invasive direct coronary artery bypass (MIDCAB) and colon cancer surgery has not been reported. We performed this unique procedure in a patient with severe recurrent coronary disease and ileocecal cancer.

II. Case report

The patient was a 76-year-old man of average physical build. He had asymptomatic chronic kidney disease and hyperlipidemia and had undergone CABG 26 years earlier.

In 2012, he felt chest discomfort on exertion, and a chest radiograph taken during a routine examination showed bilateral lung field congestion for which he consulted the cardiologists at our institute.

In May 2012, the patient was also diagnosed with right-sided stage II or more bulky colon cancer and was recommended to undergo colectomy during hospitalization for examination.

Coronary angiography (CAG), which was performed in May 2012, revealed total occlusion of the Ao-SVG-LAD and Ao-SVG-RCA grafts and patency of the Ao-SVG-LCx graft (Fig. 1).

He was then referred to our surgical unit. On physical examination, the patient was normothermic and normotensive with a regular pulse of 95 beats/min and without any abdominal symptoms.

Respiratory function showed normal pulmonary function, and renal function was slightly abnormal. This organ dysfunction, his advanced age, and the patent graft which passed across the median line encouraged us to first perform transthoracic MIDCAB and subsequently concomitant transabdominal off-pump MIDCAB and resection of the tumor in ascending colon. Therefore, we planned a two-stage operation to treat coronary artery lesions and resect the tumor.

We avoided the use of a radial artery graft because there was a high possibility of renal failure in this patient.

During the first operation, a 5-7 cm incision was made in the left submammary crease centered over the midclavicular line. Entry into the chest cavity was performed through the fifth intercostal space. We used a Thorarift Rib Retractor System (U.S. Surgical) with a superior blade that was prolonged to allow retraction without the superior ribs forming a shelf.

The left internal mammary artery (LIMA) was harvested to the level of the subclavian vein and inferiorly to the level of the xiphoid process. Once the patient was heparinized, the artery was divided distally. The retractor was switched to a standard thoracotomy retractor. The pericardium was incised longitudinally, and the previous SVG-LAD anastomotic site was identified. We chose the LAD distal to the previous operation as the anastomotic site.
We used an Octopus (Medtronic, Inc.) with an Octopus retractor holder (Yufu Itonaga Co., Ltd.) and interrupted the blood flow by using Silastic loops placed proximally. Standard running suture anastomosis was performed with 7-0 polypropylene. During anastomosis, we used an intracoronary shunt tube. Once the anastomosis was completed, the Silastic loops and the bulldog clamp on the LIMA were released, and the flow was checked by using transit time ultrasound.

After the heparin was reversed and hemostasis was assured, a single chest tube was placed in the left chest. The ribs were reapproximated, and the pectoral muscle was sutured. The skin was closed with a subcuticular suture.

During the second operation, three weeks after the first, we chose an upper median laparotomy to obtain good exposure of the target vessel. The costal arch was retracted toward the patient’s head with a Mera scapula retractor (Senko Medical Instrument Mfg. Co., Ltd.), which increased the operative exposure anteriorly and cranially. The right gastroepiploic artery (GEA) was harvested using an ultrasonic scalpel (Ethicon Endo-Surgery, Inc.). The anterior edge of the incised diaphragm was also retracted anteriorly and superiorly. The right posterior descending coronary artery was identified and was stabilized by using an AXIUS stabilizer system (GUIDANT, Inc.) attached to the Octopus retractor holder (Yufu Itonaga Co., Ltd.). The right gastroepiploic artery was grafted on the right posterior descending coronary artery with an end-to-side anastomosis.
using a 7-0 polypropylene suture (Ethicon, Inc.). The diaphragm was reapproximated after confirmation of hemostasis at the anastomotic site.

Then, the median laparotomy was extended to the pubic symphysis. The ascending colon was resected and the jejunum was anastomosed to the transverse colon. All wounds were then closed. The total operation times were 200 and 295 minutes, respectively.

The postoperative course was uneventful with an intensive care unit stay of 93 hours. A postoperative computed tomography angiogram confirmed technical success and absence of any abnormalities in the grafts (Fig. 2).

III. Discussion

We performed MIDCAB of the left internal thoracic artery (LITA) to the left anterior descending coronary artery (LAD) through a small left anterior thoracotomy because this patient had a previous CABG via medial sternotomy, and this procedure has been shown to produce excellent results with a very low mortality rate. Actuarial and event-free survival rates at 20 months are 96% and 92%, respectively. MIDCAB advantages include the avoidance of a large skin incision and cardiopulmonary bypass (CPB) morbidity. In addition, in high-risk cases such as patients with advanced cancer, less invasive CABG without CPB is recommended. Therefore, we performed a LITA-LAD CABG prior to the transabdominal operation to protect the cardiac function and to lower morbidity.

The transabdominal approach is also an attractive approach for MIDCAB. It is considered less invasive than an anterior approach or a partial sternotomy because no bone is divided. An incision confined to the abdomen, without the necessity for osteotomy, also increases the effectiveness of epidural anesthesia. In this case, we received the greatest benefit from avoiding resternotomy.

There is an excellent operative report with no perioperative strokes, renal failures, or deaths, and actuarial and event-free survival rates at 20 months of 96% and 92%, respectively. The other advantage of the transdiaphragmatic approach for patients who require reoperative coronary artery bypass grafting is avoiding damage to the primary patent grafts. On the other hand, partial contraindications for transabdominal MIDCAB include obesity, previous abdominal operations, or hepatomegaly.

Many concomitant CAD and AAA operations have been reported. These are single-stage surgical interventions consisting of MIDCAB or off-pump coronary artery bypass grafting and AAA repair to prevent perioperative life-threatening complications, including acute myocardial infarction and rupture of AAA. However, concomitant transabdominal CABG and colectomy has rarely been reported. GEA grafts have long-lasting patency; therefore, patients with a long life expectancy should undergo CABG rather than a hybrid operation with percutaneous coronary intervention (PCI). In the first place, PCI for patients who have had CABG is technically difficult, and avoiding anticoagulant medication after PCI is very advantageous prior to gastrointestinal surgery.

IV. Conclusion

We believe that concomitant transabdominal MIDCAB and colectomy or other digestive tract operations should be considered as a single combined surgical strategy in selected patients, especially in redo CABG with a possibly malignant tumor in the digestive tract.

For concomitant AAA and CABG, we think simultaneous MIDCAB and colectomy can be undertaken safely.

Disclosure Statement

The authors have no conflicts of interest.

References