One-stage Procedure for Concomitant Abdominal Aortic Aneurysm and Gastric Cancer

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Abstract. Background/Aim: A concise surgical strategy for concomitant abdominal aortic aneurysm (AAA) and operable gastric cancer remains unknown. We assessed a one-stage procedure that included endovascular abdominal aortic aneurysm repair (EVAR) and gastric resection. Patients and Methods: Fourteen patients who underwent surgery for an infrarenal AAA and gastric cancer between 1990 and 2012 were retrospectively reviewed. Demographic characteristics, aneurysm size, comorbid conditions, length of postoperative hospital stay, complications within 30 days of surgery, and survival in patients who had EVAR (n=4) were compared against patients who had an open AAA repair (n=10). Results: Demographic characteristics, aneurysm size, and comorbid conditions were similar in the EVAR and open-AAA-repair group. The mean length of hospitalization was significantly shorter in the EVAR group (15.2 days vs. 34.9 days; p=0.005), and the rate of postoperative complications was significantly lower (p<0.05). The overall survival rates in the EVAR and open-AAA-repair groups were, respectively, 100% and 80% at 1 year and 75% and 60% at 3 years; the differences between groups were not significant (p=0.788). Conclusion: In patients with concomitant AAA and gastric cancer who are eligible for EVAR, use of a one-stage procedure including EVAR and gastric resection is feasible.

In a large, randomized trial, endovascular abdominal aortic aneurysm repair (EVAR) was found to have a significantly lower 30-day operative mortality rate than open repair of abdominal aortic aneurysm (AAA) (1.8% vs. 4.3%) (1). Commercially-produced stent-grafts for treating AAA have been covered by Japanese medical insurance since 2006 (2). Before this time, our surgical protocol for treating patients with concomitant AAA and gastric cancer consisted of the following: the most severe lesion should be treated first; if the malignant lesion is advanced, it should be resected first; if the cancer is not advanced, the AAA should be resected first with use of a retroperitoneal approach; simultaneous resection of the AAA and malignant tumor by using segregated approaches may be appropriate in certain patients with early gastric cancer; and both lesions must be resected to improve long-term survival (3).

In patients who undergo laparotomy to repair an AAA, however, rupture may occur postoperatively because of collagen lysis induced by the operation or weakening of the aneurysm wall resulting from nutrient depletion and surgical dissection (4, 5). Another problem is the risk of aortic graft infection (6). To address these issues (now that EVAR is covered by Japanese medical insurance), we now usually perform a one-stage operation in patients with an AAA considered suitable for EVAR who are also undergoing surgery for concomitant gastric cancer. The goal of this practice is to avoid delay and mitigate the risk of AAA rupture and graft infection (7). To our knowledge, no previous studies have compared outcomes of EVAR and open AAA repair in patients who also require surgery for gastric cancer.

Patients and Methods

Between March 1990 and April 2012, 14 patients underwent surgery for both AAA and gastric cancer at our Institution. All tumors were staged according to the tumor-node-metastasis classification system. EVAR was offered to all patients with anatomically suitable lesions. Ten out of the 14 patients underwent open repair of their AAA; four had EVAR. The following information was obtained by reviewing the patients' medical records: age, sex, comorbid conditions (hypertension, diabetes, chronic obstruction pulmonary disease, coronary artery disease, cerebrovascular disease, and renal failure), aneurysm size, cancer stage, type of cancer surgery, postoperative
length of hospital stay, perioperative and postoperative complications, length of survival, and, if applicable, cause of death.

Baseline characteristics, length of hospital stay, and 30-day morbidity rates in the EVAR and open-repair groups were compared by two-tailed t-tests for continuous variables and χ² or Fisher’s exact tests for categorical data. Cumulative survival rates at 1 and 3 years were assessed by Kaplan–Meier analysis, and log-rank testing was used to compare rates in the EVAR group with those in the open-AAA-repair group. A p-value less than 0.05 was considered significant.

Results

Table I shows demographic, disease, operative, and outcome data for the four patients who underwent EVAR and gastric resection; Table II shows the same information for the 10 patients who had gastric resection and an open AAA repair. The results of the analysis comparing demographic characteristics, comorbid conditions, and aneurysm size in the two groups are shown in Table III. The only significant difference detected in this assessment was that patients in the EVAR group were older.

All patients in the EVAR group underwent a one-stage operation in which EVAR was performed before distal or total gastrectomy in combination with a Roux-en-Y anastomosis (Table I). In the open-AAA-repair group, the AAA procedure and cancer resection were performed in one stage in five patients and in two stages in the other five. In two of the five patients who underwent a two-stage procedure, the operations were performed during different hospital admissions. Four of the 10 patients in the open-AAA-repair group underwent distal gastrectomy, with the Billroth II (retrocolic) method used in one patient and the Billroth I technique in the other three. Four other patients underwent total gastrectomy using the Roux-en-Y method, one patient had a Billroth II total gastrectomy, and another underwent pancreaticoduodenectomy.

In the five patients in the open-AAA-repair group who had a one-stage operation, segregated approaches were used; that is, the AAA repair was performed through a retroperitoneal or transperitoneal approach and the cancer resection through a transperitoneal approach. In four of the five patients who had a two-stage procedure, the malignant lesion was resected first because a preoperative endoscopic examination, roentgenography, and computed tomographic scanning showed advanced gastric cancer. In the other patient, the aneurysm was repaired first because it was larger than 6 cm in diameter and the gastric cancer was not advanced. The mean interval between the two stages was 155.6 days (range=75-249 days). In all 10 patients who had an open AAA repair, a bifurcated graft was used for aortic reconstruction.

The mean postoperative length of stay was significantly shorter in the EVAR group compared to the open-AAA-repair group (15.2 days [range=11-22 days] vs. 34.9 days [range=19-92 days]; p=0.005).

None of the 14 patients in the series died within 30 days of AAA repair. One patient in the open-AAA-repair group died of acute renal failure 35 days after surgery. One patient in the EVAR group and three patients in the open-AAA-repair group had a postoperative complication (30-day morbidity rates, 25% and 30%, respectively; p<0.05). Specific complications are listed in Tables I and II. The case of anastomotic bleeding in the stomach in the EVAR group occurred 11 days postoperatively. No patient had an anastomotic leak, endograft infection, or late complication of surgery. One patient died of metastatic cancer 157 days postoperatively.

The mean follow-up time in the EVAR group was 38.8 months (range=22-48 months), whereas that in the open-AAA-repair group was 81 months (range=1-204 months). The difference in follow-up times reflects the fact that EVAR has been covered by Japanese medical insurance for only 8 years. Two patients who underwent EVAR and seven who had an open repair procedure died during the follow-up period, from a variety of causes (Tables I and II). The 1- and 3-year survival rates were 100% and 75%, respectively, in the EVAR group and 75% and 60% in the open-AAA-repair group (Figure 1); the differences between groups were not significant (p=0.788).

Discussion

Concomitant AAA and gastric cancer is relatively rare (3,8). Between April 1990 to March 2012, 803 patients were admitted to our Hospital because of an AAA, but only 15 (1.9%) also had gastric cancer. One of the 15 patients was not treated for the AAA because he underwent laparotomy for gastric cancer that had disseminated peritoneally. The incidence of AAA is increasing at a greater rate than that of gastric cancer because of the aging of the population and the wider use of computed tomography, that allows more AAAs to be identified (9, 10). However, the optimal treatment for
patients with concurrent AAA and gastric cancer remains controversial (11-13).

In the EVAR I trial, the 30-day mortality rate for patients undergoing EVAR was 1.7%, whereas that for patients who had open AAA repair was 4.6% (p=0.02) (1). A meta-analysis of a randomized controlled trial (14) also found that the 30-day mortality rate was lower after EVAR than after open repair (1.6% vs. 4.7%), as were the rates of major cardiac, respiratory, renal, and hemorrhagic events. Moreover, the hospital stay was shorter. Therefore, in patients with AAA, we prefer to perform EVAR whenever possible. Our results indicate that in patients who are eligible for EVAR and have operable gastric cancer, a one-stage procedure may represent a promising treatment strategy. Advantages of the one-stage procedure include an overall reduction in hospitalization and a possibly decreased risk of graft infection and delayed AAA rupture. A disadvantage may be an increased risk of postoperative bleeding if administration of heparin is required for the AAA repair. To mitigate this risk, EVAR should be performed before gastrectomy.

In patients with concomitant gastric cancer and an AAA for which EVAR is contraindicated, a feasible one-stage operative strategy might be based on use of the transperitoneal approach. None of the four patients in our series in whom an open AAA repair and gastric resection were performed through the same transperitoneal approach had a postoperative complication. However, more research on all one-stage procedures is needed.

The most important principle in the management of concomitant AAA and gastric cancer is that both lesions must be treated. Nora et al. (15) reported that the long-term survival rate was low in patients with concomitant AAA and rectal cancer who underwent only one operation to either resect the malignant tumor or repair the aneurysm. The 3-year survival rate in patients in their study, who had cancer-only surgery was 9%, whereas that in patients in whom both lesions were treated was 66%. This rate is similar to the 64% overall 3-year survival rate in our series.
Conclusion

The limitations of the study included its retrospective nature and small number of patients. However, our experience suggests that use of a one-stage procedure including EVAR in patients with concomitant AAA and gastric cancer is feasible and may decrease postoperative morbidity. We now use the one-stage procedure in all patients with AAA and gastric cancer for whom EVAR is not contraindicated.

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References


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