

# CASE REPORT

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## Laparoscopic and endoscopic cooperative surgery as palliative treatment for elderly patients with gastric cancer

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### ABSTRACT

Oncological gastrectomy, despite remaining a mainstay of gastric cancer treatment, is reportedly associated with high morbidity and mortality in elderly patients. Less invasive modalities suitable for senior gastric cancer patients with insufficient surgical tolerance are thus needed. We adopted laparoscopic and endoscopic cooperative surgery as an alternative for elderly gastric cancer cases unsuitable for aggressive gastrectomy. To date, we have experienced three cases (80–86 years old) undergoing palliative laparoscopic and endoscopic cooperative surgery. Postoperative courses were uneventful in two cases, while sutural leakage occurred in the other, which was managed conservatively. Postoperative loss of body weight and skeletal muscle mass appeared to be minimal according to bioelectrical impedance analyses. No gastric cancer recurrence was detected in any of our three cases. As to the balance between radicality and safety, laparoscopic and endoscopic cooperative surgery is potentially a viable option for geriatric gastric cancer patients in whom conventional gastrectomy is contraindicated.

Keywords: elderly patients, gastric cancer, laparoscopic and endoscopic cooperative surgery, palliation

Abbreviations:

CT: computed tomography

GC: gastric cancer

LECS: laparoscopic and endoscopic cooperative surgery

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### INTRODUCTION

Gastric cancer (GC) remains a major life-threatening disease worldwide, especially in Eastern nations like Japan.<sup>1</sup> According to the latest dataset from the cancer registry and statistics in Japan, GC ranks third in domestic cancer-related mortality with over 40,000 deaths.<sup>2</sup> The question is why GC still continues to be one of the most frequent causes of death, despite advancements in

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therapeutic modalities.<sup>3</sup> Furthermore, there has, in fact, been a steady decline in the age-adjusted incidence rate.<sup>4</sup> One possible explanation is the marked aging of the GC-affected population. Several past studies from Japan demonstrated that the number of geriatric GC patients, some of whom were over 85 years of age, has been dramatically increasing.<sup>4</sup> These demographic trends confer a serious burden in oncology care, as advanced age itself is widely recognized as a key risk factor for unfavorable survival outcomes following GC treatment.<sup>5</sup>

Although oncological gastrectomy is one of the mainstays for treating GC, its application to very elderly patients poses a major challenge for surgeons. Gastrectomy with standard nodal clearance was reportedly associated with a high morbidity rate,<sup>6</sup> and even a high mortality rate,<sup>7</sup> in GC patients of advanced age. Also, our previous publication suggested marked deterioration of sarcopenic status after radical gastrectomy in elderly GC patients, which may negatively affect long-term outcomes.<sup>8</sup> That study, using a multivariate analysis, identified total/proximal gastrectomy as a risk factor for long-term severe skeletal muscle loss in very elderly patients. These results raised the possibility that aggressive gastric surgery should probably be avoided in elderly patients, with low tolerance to operative interventions, in order to secure surgical safety. Less invasive options tailored to such cases are thus eagerly awaited.

Laparoscopic and endoscopic cooperative surgery (LECS) is a minimally invasive technique for partial gastrectomy performed by an approach combining laparoscopy and endoscopy. It allows minimal-extent resection of the tumor and can thereby reduce surgical stress,<sup>9</sup> and its indications have been expanded to gastric malignancies with some non-exposure procedures becoming readily available.<sup>10</sup> Given these background factors, since 2018, we have been using LECS as an alternative for palliation-oriented gastrectomy in geriatric GC cases suspected to have poor surgical tolerance. In this report, we outline the clinicopathological characteristics and the therapeutic courses of cases undergoing LECS for GC and discuss its actual efficacy as a palliative treatment.

## CASE SERIES

Between February 2018 and June 2021, three elderly cases underwent palliative-setting LECS in our institution. Detailed retrospective information was obtained on these three cases. Disease stage was presented based on the UICC TNM grading system, 8th edition.<sup>11</sup> Performance status was documented employing the Eastern Cooperative Oncology Group scale. Written informed consent from each individual was waived because of the retrospective design.

In all three cases, LECS was performed after explaining the associated potential risk for oncological compromise to both the patient and the family. Preoperative multidisciplinary consultations, including clinical oncologists, radiologists and gastroenterologists, were also conducted. Our post-gastrectomy tests routinely included a physical examination, esophagogastroduodenoscopy (EGD) and computed tomography (CT). Body composition data, eg, skeletal muscle mass, was also periodically obtained using a bioelectrical impedance analysis device (InBody 770 [Biospace, Tokyo, Japan]).

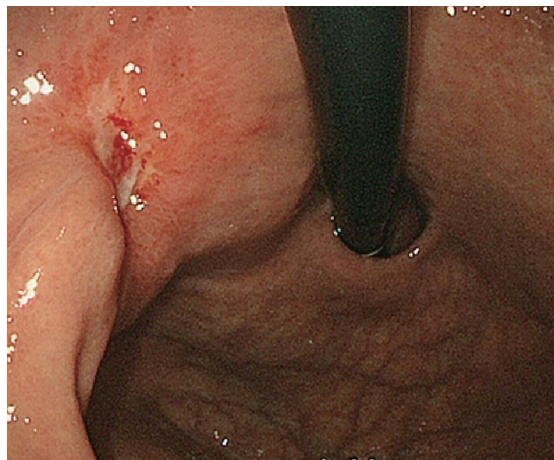
### *Case 1*

An 83-year-old woman, with a history of chronic kidney disease and dementia (performance status 2), was emergently transported to our hospital due to loss of consciousness. Laboratory blood tests showed marked anemia with a hemoglobin level of 7.1 g/dL. Subsequent EGD demonstrated an ulcerative lesion at the upper gastric corpus, biopsy of which yielded a histologic diagnosis of poorly differentiated adenocarcinoma (Fig. 1). CT depicted gastric wall-thickening

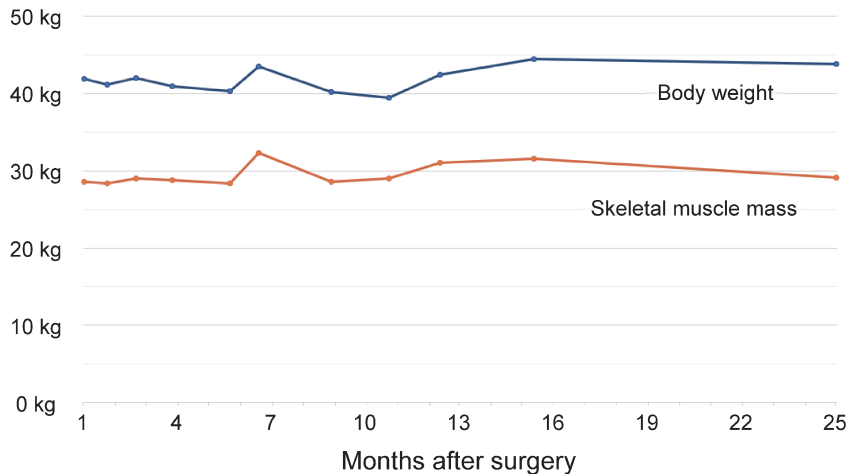
with no evidence suggestive of metastasis in the regional lymph nodes or distant organs. Under the diagnosis of cT3N0M0, we opted for LECS-style tumor resection, instead of total gastrectomy.

The operation was successfully completed with minor blood loss (duration 394 min). It was initiated in the fashion of non-exposed endoscopic wall-inversion surgery (NEWS) to avoid cancer seeding to the peritoneal space,<sup>12</sup> but had to be converted to conventional LECS due to technical difficulty maintaining the non-perforation process. The tumor was macroscopically removed without stenosis or distortion of the stomach. She was uneventfully discharged from our department on the 11th postoperative day. Pathological examination of the resected specimen showed serosal invasion (pT4a) with a positive microscopic horizontal margin.

She was periodically followed up without adjuvant chemotherapy. Postoperative bioelectrical impedance analysis revealed no significant loss, rather modest gains, in body weight and skeletal muscle mass (Fig. 2). Twenty-six months after the surgery, monitoring CT demonstrated a new pancreatic cancer, and she died of this malignancy four months later, with no evidence of GC recurrence.



**Fig. 1** Endoscopy revealed an ulcerative tumor at the upper gastric corpus

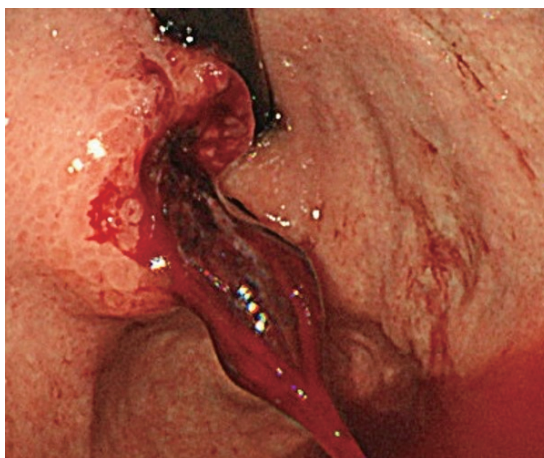


**Fig. 2** Postoperative body composition data (Case 1)

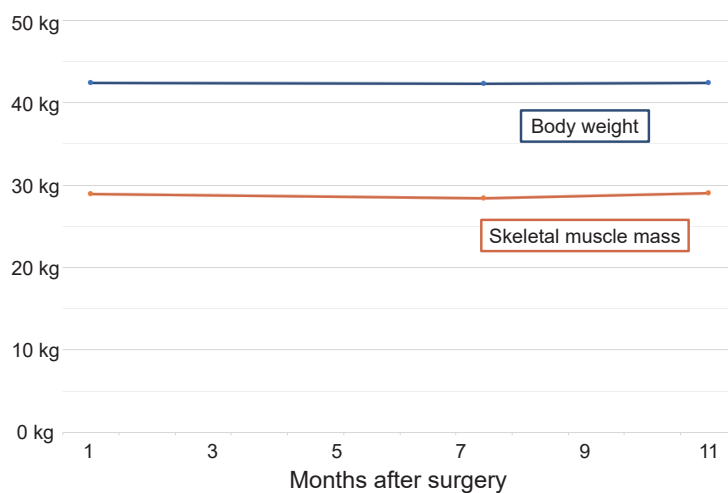
Case 2

An 86-year-old man complained of abdominal pain and was transferred to our hospital, where he had received anti-coagulation/platelet therapy following surgical aortic valve replacement (performance status 1). Blood tests showed severe anemia and EGD revealed a hemorrhagic ulcer below the fundus (Fig. 3). The biopsy confirmed well differentiated adenocarcinoma components. CT depicted neither nodal nor distant metastases, yielding a diagnosis of cT2N0M0. Given the patient's suspected intolerance to radical proximal gastrectomy, based on his overall condition, LECS was chosen to achieve palliation.

NEWS-style gastric resection, without intraoperative perforation, was successfully accomplished with a 326-min procedure and 30-mL blood loss. In this procedure, laparoscopic seromuscular incision around the tumor was carried out following endoscopic intraluminal marking. Subsequently, the seromuscular layers were sutured and the lesion was thus inverted into the gastric



**Fig. 3** A hemorrhagic tumor was found below the fundus



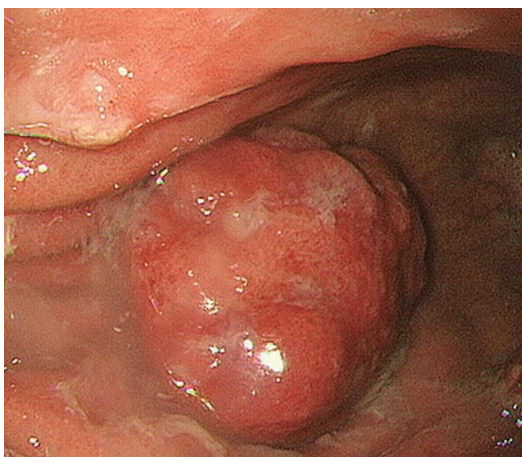
**Fig. 4** Postoperative body composition data (Case 2)

cavity. The inverted tumor was endoscopically removed. Pathological examination of the specimen confirmed that the muscle-invasive tumor (pT2) had been entirely resected with negative margins. He experienced sutural leakage after the operation, which was managed conservatively, and was discharged home on the 69th postoperative day. His body weight and skeletal muscle mass measured by bioelectrical impedance analysis remained stable throughout the postoperative period (Fig. 4). Postoperative follow-up revealed no GC recurrence. Unfortunately, he died suddenly of cerebral bleeding 12 months after the surgery.

### Case 3

An 80-year-old man received treatment for prostate cancer with multiple bone metastases, which had caused lower limb paralysis (performance status 3). He also had a history of atrial fibrillation and was maintained on regular anti-coagulation medications. He underwent EGD because of serum carcinoembryonic antigen elevation and a protruding tumor was demonstrated at the greater curvature of the gastric corpus (Fig. 5). The tumor was histologically diagnosed as moderately differentiated adenocarcinoma. Neither nodal nor distant disease dissemination was observed on CT (cT2N0M0). Life expectancy associated with metastatic prostate cancer was estimated to be approximately two years according to a urological consultation, and LECS for the GC was thus performed to minimize the risk of potential bleeding.

The tumor was successfully resected (duration 117 min, blood loss unmeasurable). During the operation, the gastric wall around the tumor was lifted upward like a crown shape by suturing in order to avoid disseminating cancer cells (inverted-LECS technique).<sup>13</sup> The resected tumor was dropped into the stomach and endoscopically picked up without any contact on the peritoneal space. Microscopically, the tumor depth was diagnosed as pT1b and the horizontal margins were negative. He was discharged from our department on the 8th postoperative day free of complications. He remains alive, to date, without detectable GC relapse, 14 months after the surgery. Postoperative bioelectrical impedance analysis results were not available.



**Fig. 5** A protruding tumor was detected at the greater curvature of the corpus

## DISCUSSION

We have described herein the surgical outcomes of three elderly cases with poor physical status who underwent LECS for GC with palliative intent. In these cases, conventional gastrectomy with lymph node dissection would basically have been regarded standard treatment, but the risk of morbidity, and even mortality, was unacceptably high. Less invasive alternatives suitable for such cases were needed to bridge the gap between aggressive gastrectomy and simple observation. Review of our clinical experience suggests that LECS, ie, applying a minimally invasive approach, has the potential to contribute to controlling local symptoms. Postoperative loss of body weight and skeletal muscle mass appeared to be minimal and no GC recurrences were detected in any of our cases.

Another therapeutic option for palliating local GC symptoms is irradiation. Palliative radiotherapy is appealing because it is non-invasive and may be applicable to frail patients with comorbidities. However, the effectiveness of radiation for gastric bleeding is still uncertain, with the reported response rates ranging from just 50–73%.<sup>14–16</sup> Even if hemorrhage is temporally controlled by radiation, the risk of re-bleeding persists. Taking reported results collectively, the palliative relevance of radiating resectable GC has yet to be determined and remains an area of controversy. Palliative benefits of chemotherapy have also yet to be established for elderly GC patients, because such cases are under-represented in clinical trials.<sup>17</sup>

We also need to address and keep in mind the limitations of LECS. First, this procedure can seed tumor cells into the peritoneal cavity during intentional perforation of the gastric wall. However, there are some modified LECS techniques such as inverted-LECS,<sup>13</sup> closed-LECS<sup>18</sup> and NEWS,<sup>12</sup> which can all reduce the risk of peritoneal contamination. Second, the feasibility of LECS depends on the tumor location. In particular, LECS for tumors located close to the esophagogastric junction is technically demanding and might be contraindicated.<sup>19</sup> Third, LECS for gastric cancer may require relatively long operative durations. Despite these limitations, minimal resection of the tumor applying the LECS procedure may have facilitated surgical stress reduction and contributed to maintenance of body composition in our series. Although palliative LECS is still uncommon, with only two previous reports describing its use,<sup>20,21</sup> it is anticipated to become an increasingly attractive option with the ongoing aging of society. When treating elderly GC patients, we should comprehensively determine their functional age, rather than chronological age, before therapeutic decision-making as it is a good indicator of treatment response.<sup>17</sup> Palliative LECS may well be included in such individualized approaches for geriatric GC cases and be advantageous in resolving the challenges encountered in managing patients with diminished physiological reserves.

In summary, we reviewed our clinical experiences with three elderly cases receiving LECS for GC as palliative treatment. This procedure appeared to contribute to both control of local symptoms and minimization of surgical stress. Palliative LECS is a potentially safe and feasible option for elderly GC cases unable to tolerate aggressive gastrectomy.

## DISCLOSURE STATEMENT

The authors have no conflicts of interest to declare.

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