

# Minimally Invasive Surgery

## The Emerging Role in Gastric Cancer



Michael R. Cassidy, MD<sup>a,1</sup>, Sepideh Gholami, MD<sup>a,1</sup>, Vivian E. Strong, MD<sup>b,\*</sup>

### KEYWORDS

- Gastric cancer • Laparoscopic gastrectomy • Robotic gastrectomy
- Minimally invasive gastrectomy

### KEY POINTS

- Minimally invasive approaches to the treatment of gastric cancer are emerging as a preferred option for well-selected patients.
- Appropriate patient selection is important.
- Minimally invasive techniques allow for decreased blood loss, less pain, and enhanced recovery.
- Laparoscopic and robotic approaches can provide equivalent oncologic outcomes when compared with open gastrectomy.
- Most data on minimally invasive gastrectomy come from Eastern countries, but the Western experience is growing.

### INTRODUCTION

Although gastric cancer is less common in the United States than in other areas of the world, it remains an important contributor to cancer death and is associated with worse survival than in Eastern countries.<sup>1</sup> In 2012, there were an estimated 951,600 new diagnoses of gastric cancer and 723,100 deaths due to gastric cancer worldwide.<sup>2</sup> The overall incidence of gastric cancer in the United States is increasing from 22,000 to 25,000 new cases per year, with a particular increase in incidence of gastroesophageal junction and gastric cardia tumors. Additionally, in the young population of 25 to 39 year olds, the United States has seen a 70% increase in noncardia gastric cancer over the past several years.<sup>3</sup> Moreover, gastric cancer may manifest in a variety of histologic, anatomic, and genetic patterns, which influences the surgical approach and requires a customized and multimodality treatment plan for each

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<sup>a</sup> Department of Surgery, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, C-1272, New York, NY 10065, USA; <sup>b</sup> Gastric and Mixed Tumor Service, Department of Surgery, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, H-1217, New York, NY 10065, USA

<sup>1</sup> Contributed equally to this work.

\* Corresponding author.

E-mail address: [strongv@mskcc.org](mailto:strongv@mskcc.org)

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patient. Gastrectomy with curative intent remains the only treatment that can offer potential for cure in gastric cancer patients. Over the past 20 years, minimally invasive techniques have emerged that enhance the surgical armamentarium of approaches to both complete gastric cancer staging and curative resection. Multiple randomized trials comparing laparoscopic to open gastrectomy have proved oncologic equivalency of the 2 approaches and have demonstrated favorable outcomes in postoperative recovery with minimally invasive approaches.<sup>4–9</sup> As a result, minimally invasive surgery is emerging as a preferred option in the treatment of well-selected gastric cancer patients. As knowledge grows regarding the conduct and outcomes of robotic-assisted approaches, this new technique is being adopted both in the United States and elsewhere, with favorable outcomes in retrospective series. This article discusses the emerging role of both laparoscopic and robot-assisted approaches to gastric cancer management.

### THE ROLE OF DIAGNOSTIC LAPAROSCOPY AND PERITONEAL WASHING CYTOLOGY

Laparoscopy has emerged as an important staging modality for locally advanced gastric cancer. Patients who are found to have T3 or greater disease or node-positive disease, by CT scan and/or endoscopic ultrasonography (EUS), benefit from staging laparoscopy because the findings may alter the management strategy and treatment intent in a significant proportion of patients.

In a study of 657 patients at Memorial Sloan Kettering Cancer Center (MSKCC), diagnostic laparoscopy was performed for patients with gastric adenocarcinoma and staging CT scans showing no definitive evidence of metastatic disease. In the entire study population, visible peritoneal metastases were identified in 31% of patients, suggesting a high incidence of radiographically occult metastatic disease.<sup>10</sup> Clinicopathologic predictors of identifying radiographically occult peritoneal metastases were location of the tumor at the gastroesophageal junction or involving the entire stomach, poor differentiation on histology, and age less than or equal to 70 years. Imaging predictors of identifying peritoneal metastases at laparoscopy were lymphadenopathy greater than 1 cm and T3/T4 tumors. EUS may also be used to stratify risk for radiographically occult metastatic disease. EUS findings in 94 patients were correlated with their diagnostic laparoscopy results in a retrospective study that identified patients as high risk when EUS showed T3, T4, and/or N1 disease; all others were considered low risk. The high-risk group had a 25% likelihood of peritoneal metastatic disease compared with 4% in the low-risk group.<sup>11</sup> Because peritoneal metastatic disease changes treatment intent from curative to palliative, diagnostic laparoscopy, therefore, can alter the goals of therapy in a large proportion of patients considered to have locally advanced disease at presentation.

Diagnostic laparoscopy additionally provides the opportunity to collect peritoneal washings for cytology, in the absence of visible peritoneal disease. Several studies have demonstrated that the presence of cancer cells in peritoneal washings of gastric cancer patients is a significant predictor of mortality from the disease. In a study of 1297 patients with gastric cancer who underwent peritoneal lavage, the population with positive cytology had a 5-year survival rate of only 2%.<sup>12</sup> At MSKCC, in a study of 371 patients who underwent R0 resection for gastric cancer, those who had positive peritoneal cytology had a significantly reduced median survival of 14.8 months compared with 98.5 months in those with negative cytology. In multivariate analysis, positive cytology was the strongest predictor of death from gastric cancer.<sup>13</sup> Other studies have also convincingly demonstrated reduced survival in those with positive peritoneal cytology.<sup>14–17</sup> Owing to this evidence, positive peritoneal cytology is

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