Outcomes after completion total gastrectomy for gastric remnant cancer: experience from a Canadian tertiary centre

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Background: There is controversy about the safety and outcomes of completion total gastrectomy (CTG) for gastric adenocarcinoma. We compared a cohort of patients who underwent CTG for gastric remnant cancer (GRC) after partial gastrectomy for benign disease with patients who underwent primary total gastrectomy (PTG) for sporadic gastric cancer.

Methods: We retrospectively reviewed a single-institution, prospectively maintained clinical database of patients who had undergone gastrectomy from 2005 to 2016 for demographic, surgical, clinical and tumour pathology data, as well as postoperative, pathologic and oncologic outcomes including complications, length of stay, disease-free survival and overall survival. We used the χ^2 and Wilcoxon rank-sum tests to compare groups and performed the Mantel–Cox log-rank test for Kaplan–Meier survival estimates. We compared the CTG group to all patients in the PTG group and to a 5:1 propensity-matched PTG cohort.

Results: We analyzed data for 64 patients (9 CTG, 55 PTG). The groups were equivalent at baseline and had similar operative, perioperative treatment and pathologic characteristics. After propensity matching, the reoperation rate for complications was higher after CTG than PTG (22% v. 0%, $p = 0.03$), but there was no significant difference in the overall complication rate or length of stay. At 5 years, there was no difference in disease-free survival (28% v. 58%, $p = 0.4$) or overall survival (33% v. 44%, $p = 0.7$).

Conclusion: Our findings suggest that CTG for gastric adenocarcinoma can be undertaken safely a priori with no additional risk of recurrence or death compared to PTG for sporadic gastric cancer.

Contexte : Les avis divergent en ce qui concerne l'innocuité et les résultats de la gastrectomie totale complémentaire (GTC) dans les cas d'adénocarcinome gastrique. Nous avons comparé une cohorte de patients soumis à la GTC pour cancer gastrique résiduel (CGR) après une gastrectomie partielle pour maladie bénigne à des patients ayant subi une gastrectomie totale primaire (GTP) pour cancer gastrique sporadique.

Méthodes : Nous avons passé en revue rétrospectivement une base de données (maintenue de manière prospective) regroupant des patients soumis à une gastrectomie entre 2005 et 2016 dans un seul établissement; et nous avons recueilli les données démographiques, chirurgicales, cliniques et anatomopathologiques tumorales, de même que les résultats oncologiques, y compris complications, durée du séjour, survie sans maladie et survie globale. Nous avons utilisé les tests du χ^2 et de Wilcoxon pour comparer les groupes et nous avons estimé la survie selon le méthode Kaplan–Meier à l'aide du test log-rank de Mantel–Cox. Nous avons comparé le groupe GTC à tous les patients du groupe GTP et à une cohorte assortie selon un score de propension 5:1.

Résultats : Nous avons analysé les données de 64 patients (9 GTC, 55 GTP). Les groupes étaient équivalents au départ et présentaient des caractéristiques similaires pour ce qui est de la chirurgie, des soins périopératoires et des analyses anatomopathologiques. Suite à l'appariement par score de propension, le taux de réintervention pour complications a été plus élevé après la GTC qu'après la GTP (22 % c. 0 %, $p = 0,03$), mais on n'a noté aucune différence significative pour ce qui est du taux de complications global ou de la durée du séjour. Après 5 ans, il n'y avait pas de différence de survie sans maladie (28 % c. 58 %, $p = 0,4$) ou de survie globale (33 % c. 44 %, $p = 0,7$).

Conclusion : Selon nos observations, a priori, la GTC peut être effectuée sans danger dans les cas d'adénocarcinome gastrique, sans risque additionnel de récurrence ou de décès, comparativement à la GTP pour cancer gastrique sporadique.

Gastric remnant cancer (GRC) is a clinical entity that has been described in the literature since the early 1920s.¹ Classically, it is defined as adenocarcinoma arising in the remnant stomach at least 5 years following gastrectomy.² Historically, partial gastrectomy was performed for benign ulcerative disease. The indications for this procedure have greatly expanded over time. As cancer detection and treatment become more sophisticated in our aging population, there has been a growing interest in the surgical literature regarding the epidemiologic characteristics of GRC and the role of endoscopic screening in this condition.^{3,4} Tanigawa and colleagues⁵ investigated clinical and histopathologic characteristics of GRC, with broader definitions to include any cancer developing in the gastric remnant irrespective of original disease or operative method for gastric resection. There is controversy in the literature about the outcomes and optimal management of this unique disease. Some investigators support aggressive surgical management, reporting similar outcomes as in conventional gastric cancer,^{6,7} whereas others paint a less promising picture of GRC treatment, claiming poor prognosis owing to difficult detection, extended local and regional invasion, and difficult surgical excision.^{8–10} The incidence of GRC, reported to account for 3%–10% of all gastric cancers, appears to be increasing, with low 5-year survival rates (< 25%) despite complete resection.^{11–13} In light of this problem and given the sparse North American literature available on the subject, we reviewed our experience with completion total gastrectomy (CTG) for GRC and compared the surgical, pathologic and oncologic outcomes of this procedure to those of primary total gastrectomy (PTG) for sporadic gastric cancer. We hypothesized that GRC is a more aggressive disease with worse outcomes following CTG compared to PTG for sporadic gastric cancer.

METHODS

Patient selection

The study was performed in a high-throughput tertiary care centre in Montreal after being approved by the McGill University Health Centre Ethics Review Board. We retrospectively reviewed a single-institution, prospectively maintained clinical database of patients who had undergone total gastrectomy from 2005–2016 for demographic, surgical, clinical and tumour pathology data, as well as postoperative and oncologic outcomes including complications, length of stay, disease-free survival and overall survival. We recorded all relevant data on neoadjuvant and adjuvant systemic treatment and radiation therapy. We included all adult patients who had undergone total gastrectomy, whether CTG or PTG, for adenocarcinoma of the stomach. We excluded patients who had had prior partial gastrectomy for gastric cancer or gastrectomy

for a gastrointestinal stromal tumour or other types of cancer, those who had had partial gastrectomy, those who had undergone prophylactic gastrectomy for hereditary gastric cancer syndromes, those who had had palliative resection, cases of gastrectomy for nononcologic reasons (e.g., postoperative necrosis, nonneoplastic gastric outlet obstruction) and cases in which no carcinoma was discovered on final pathologic examination.

Propensity matching

We performed 5:1 propensity-score matching to compare CTG and PTG cohorts that were balanced with respect to patient characteristics, neoadjuvant and adjuvant treatment characteristics, and tumour characteristics. Comorbidity was expressed with the Charlson Comorbidity Index, a composite index score that combines 19 medical conditions, each weighted 1 to 6. The Charlson Comorbidity Index has been validated in multiple settings as a reliable predictor of perioperative morbidity and mortality.¹⁴ We compared surgical and oncologic outcomes between the CTG cohort and the full PTG cohort as well as the propensity-matched PTG cohort.

Surgical and pathologic reporting

All gastrectomy procedures were done with curative intent. Tumour staging was performed in accordance with the pathological classification of the seventh edition of the *AJCC Cancer Staging Manual*.¹⁵ Other relevant pathologic data were recorded, including tumour grade, Lauren classification,¹⁶ presence of signet-ring cells, lymphovascular invasion, perineural invasion, lymph node retrieval, number of positive lymph nodes, lymph node ratio, extent of lymph node dissection as defined by surgeon's description, residual tumour classification and presence of distant metastases. Extent of lymph node dissection was categorized as D1 (only the perigastric nodes, stations 1–6), D2 (additional dissection of node stations 7–11) or D3 (additional dissection of stations 12–14). Routine intraoperative consultation with the pathologist for assessment of margins was performed. All patients had a gross assessment of the margins; frozen-section assessment was performed at the discretion of the pathologist after gross assessment. This approach has been previously described.¹⁷ We used the Clavien–Dindo classification¹⁸ to describe postoperative complications.

Statistical analysis

Data were recorded and organized in Microsoft Excel 2016 version 15.32 for Mac. We performed statistical analyses using R version 3.4.2 (R Foundation for Statistical Computing) for Mac. Results were reported as mean and standard error (SE), or median and interquartile range (IQR),

as appropriate. We used χ^2 and Wilcoxon rank-sum tests to compare groups and performed the Mantel–Cox log-rank test for Kaplan–Meier survival estimates, with statistical significance set at $p < 0.05$. p values for 2-tailed tests were reported. There were no missing data.

RESULTS

A total of 276 patients underwent total gastrectomy for adenocarcinoma of the stomach during the study period, of whom 212 were excluded because of prior gastric cancer (10 patients), partial gastrectomy (180), wrong diagnosis (17) or prophylactic gastrectomy (5). Thus, we analyzed the data for 64 patients who had had total gastrectomy (CTG in 9 cases and PTG in 55). All 9 patients who had undergone CTG had previously had a Billroth II reconstruction procedure. The median age of the 64 patients was 70 (IQR 60–77) years, and 48 patients (75%) were men. At baseline, the CTG and PTG groups were similar in terms of demographic variables (e.g., age and sex), comorbidities, symptoms and functional status at presentation, neoadjuvant or adjuvant treatment characteristics, and surgical and anesthesia approaches and duration (Table 1). After 5:1 propensity-score matching, there were 9 patients in the CTG group and 45 patients in the PTG group.

Tumour pathologic features

The CTG and PTG groups were similar with respect to tumour histologic features, including grade, Lauren classification, lymphovascular invasion and perineural invasion. Signet-ring cell features were present in 22 patients (40%) in the PTG group and no patients in the CTG group ($p = 0.05$). The mean lymph node ratio was equivalent in the 2 groups, but a significantly larger median number of total lymph nodes was retrieved in patients who underwent PTG than in those who underwent CTG (30 v. 11, $p < 0.001$). The difference in median number of positive nodes retrieved was not statistically significant (6 v. 1, $p = 0.6$). Residual disease status R0 was equivalent in the 2 groups, but there were significantly more D2 and D3 dissections in the PTG group than in the CTG group (51 [93%] v. 5 [56%], $p = 0.01$) (Table 2).

Surgical outcomes

Surgical outcomes for the full cohort and the propensity-matched group are shown in Table 3 and Table 4, respectively. For the full cohort, no differences in the overall complication rate or length of stay were observed between the 2 groups. There were no in-hospital deaths in the CTG group. One patient in the PTG group died in hospital. This occurred in the context of a left middle cerebral artery territory infarct secondary to new atrial fibrillation

that developed in the postoperative period. Following a lengthy hospital stay, the patient's clinical condition deteriorated and she was transferred to palliative medicine. There was no difference in the overall complication rate between the propensity-matched PTG group and the CTG group. However, there was a significant difference in the rate of serious complications (Clavien–Dindo classification grade III-b) requiring reoperation (0 [0%] v. 2 [22%], $p = 0.03$). The reasons for reoperation were significant bile leak necessitating left hepatectomy, ongoing bleeding necessitating evacuation of hemoperitoneum and hemostasis, and wound dehiscence necessitating abdominal closure.

Oncologic outcomes

We found no statistically significant difference in median 5-year disease-free survival or median 5-year overall survival between the CTG and PTG groups, for either the full cohort (Table 5) or the propensity-matched group (Table 6). Kaplan–Meier survival curves showing disease-free survival and overall survival in the propensity-matched PTG and CTG cohorts are shown in Fig. 1 and Fig. 2, respectively.

DISCUSSION

The discovery of *Helicobacter pylori* in 1982 radically changed the scope of treatment for peptic ulcer disease, from primarily surgical intervention to mostly medical avenues.^{19,20} Despite the decreasing popularity of peptic ulcer surgery, partial gastrectomy was commonly performed in the second half of the 20th century for treatment of benign peptic ulcer disease and is still occasionally done for treatment of emergency situations such as refractory bleeding, perforation and gastric outlet obstruction. Di Leo and colleagues²¹ found that the latency period between partial gastrectomy and detection of GRC could extend up to 30 years when initial surgery was performed for benign disease. As we observed in the current study, delays were shorter when initial surgery was for gastric cancer.²¹ Although the number of partial gastrectomy procedures for benign ulcer disease is decreasing, we can only speculate about the future burden of GRC given the lengthy latency period. Moreover, bariatric procedures have become more common, with nearly 200 000 cases performed per year in the United States.²² Although we cannot extrapolate from previous gastrectomy for ulcer to bariatric procedures, to our knowledge, there have been no good long-term studies investigating the incidence of cancer development in the “at-risk” remnant following weight-loss surgery.²³ Therefore, understanding the prognosis and best management of GRC remains an important and relevant issue, and future investigations in bariatric populations may be necessary.

We observed R0 resection in 92% of all patients and in 89% of those who underwent CTG, which compares favourably with the reported range of 60%–90%.^{21,24}

The extent of lymphadenectomy, an established prognostic factor for better locoregional control and survival in gastric cancer, was D2 or D3 in 56% of our patients who underwent CTG. This is

Table 1. Baseline characteristics of patients who underwent total gastrectomy for adenocarcinoma of the stomach

Characteristic	Group; no. (%) of patients*		p value
	Primary total n = 55	Completion total n = 9	
Age, yr, median (IQR)	67 (60–75)	75 (72–82)	0.4
Male sex	40 (73)	8 (89)	0.5
Charlson Comorbidity Index score, median (IQR)	1 (0–2)	0 (0–2)	0.2
Virgin abdomen	40 (73)	0 (0)	0.001
Any symptoms	49 (89)	8 (89)	1.0
Dysphagia	7 (13)	0 (0)	0.6
Upper gastrointestinal bleed	16 (29)	1 (11)	0.5
Early satiety	14 (25)	0 (0)	0.2
Weight loss	27 (49)	6 (67)	0.5
Abdominal pain	31 (56)	5 (56)	1.0
ECOG Performance Status grade, median (IQR)	0 (0–1)	1 (0–1)	0.2
Neoadjuvant chemotherapy			
Any	30 (54)	3 (33)	0.1
Carboplatin + docetaxel	1 (2)	0 (0)	
Cisplatin + fluorouracil	2 (4)	0 (0)	
Docetaxel + fluorouracil	0 (0)	1 (11)	
Docetaxel + cisplatin + fluorouracil	23 (42)	2 (22)	
Docetaxel + FOLFIRI	1 (2)	0 (0)	
Epirubicin + cisplatin + fluorouracil	1 (2)	0 (0)	
FOLFOX	1 (2)	0 (0)	
Folinic acid	1 (2)	0 (0)	
Folinic acid + fluorouracil	0 (0)	0 (0)	
Oxaliplatin + capecitabine	0 (0)	0 (0)	
Neoadjuvant chemotherapy and radiation therapy	4 (7)		0.9
Operative approach			
Open	53 (96)	9 (100)	0.8
Laparoscopic converted to open	1 (2)	0 (0)	
Laparoscopic	1 (2)	0 (0)	
Anesthesia			
General	24 (44)	4 (44)	0.4
General + nerve block	9 (16)	3 (33)	
General + epidural	22 (40)	2 (22)	
Duration of surgery, min, median (IQR)	188 (160–234)	182 (123–225)	0.5
Adjuvant chemotherapy			
Any	25 (45)	3 (33)	0.3
Fluorouracil	1 (2)	0 (0)	
Capecitabine + oxaliplatin	0 (0)	1 (11)	
Docetaxel + fluorouracil	0 (0)	1 (11)	
Docetaxel + cisplatin + fluorouracil	13 (24)	0 (0)	
Epirubicin + cisplatin + fluorouracil	2 (4)	0 (0)	
FOLFIRI	2 (4)	0 (0)	
FOLFOX	2 (4)	0 (0)	
Folinic acid + fluorouracil	2 (4)	0 (0)	
Oxaliplatin + capecitabine	1 (2)	1 (11)	
Oxaliplatin + capecitabine + bevacizumab	1 (2)	0 (0)	
Regorafenib	1 (2)	0 (0)	
Adjuvant chemotherapy and radiation therapy	8 (14)	1 (11)	0.3

ECOG = Eastern Cooperative Oncology Group; FOLFIRI = folinic acid + fluorouracil + irinotecan; FOLFOX = folinic acid + fluorouracil + oxaliplatin; IQR = interquartile range.
*Except where noted otherwise.

comparable to the rate reported in a recent multi-institutional Italian study, 53%.²¹

We found a high rate of perioperative complications in the CTG cohort, with 33% being considered severe

Table 2. Tumour pathologic characteristics

Variable	Group; no. (%) of patients*		p value
	Primary total	Completion total	
No. of lymph nodes retrieved, median (IQR)	30 (21–45)	11 (11–15)	< 0.001
No. of positive lymph nodes, median (IQR)	6 (0–15)	1 (0–3)	0.6
Lymph node ratio, mean $\pm$ SE	0.26 $\pm$ 0.04	0.12 $\pm$ 0.06	0.4
Lymph node dissection level			
D1	4 (7)	4 (44)	0.01
D2/D3	51 (93)	5 (56)	
R0 resection	51 (93)	8 (89)	1.0
Lauren classification of pathologic subtype			
Intestinal	10 (18)	2 (22)	1.0
Diffuse	45 (82)	7 (78)	
Pathologic grade			
Well-differentiated	2 (4)	2 (22)	0.08
Moderately differentiated	15 (27)	3 (33)	
Poorly differentiated	38 (69)	4 (44)	
Signet-ring cells	22 (40)	0 (0)	0.05
Lymphovascular invasion	41 (74)	7 (78)	1.0
Perineural invasion	40 (73)	5 (56)	1.0
T stage			
T0	2 (4)	0 (0)	0.4
T1	6 (11)	1 (11)	
T2	6 (11)	3 (33)	
T3	18 (33)	3 (33)	
T4	23 (42)	2 (22)	
N stage			
N0	18 (33)	3 (33)	
N1	5 (9)	3 (33)	
N2	11 (20)	3 (33)	
N3	21 (38)	0 (0)	
M stage			
M0	48 (87)	9 (100)	0.6
M1	7 (13)	0 (0)	
Pathologic stage			
0 (pathologic complete response)	1 (2)	0 (0)	0.3
I-A	4 (7)	1 (11)	
I-B	4 (7)	1 (11)	
II-A	4 (7)	2 (22)	
II-B	11 (20)	1 (11)	
III-A	5 (9)	3 (33)	
III-B	9 (16)	1 (11)	
III-C	10 (18)	0 (0)	
IV	7 (13)	0 (0)	

IQR = interquartile range; SE = standard error.
*Except where noted otherwise.

Table 3. Surgical outcomes of full cohort

Outcome	Group; no. (%) of patients*		p value
	Primary total	Completion total	
Any complication	26 (47)	4 (44)	1.0
Clavien–Dindo classification grade			
I	4 (7)	1 (11)	0.004
II	12 (22)	0 (0)	
III-a	9 (16)	1 (11)	
III-b	0 (0)	2 (22)	
IV	0 (0)	0 (0)	
V	1 (2)	0 (0)	
Length of hospital stay, d, median (IQR)	9 (7–20)	7 (7–9)	0.4

IQR = interquartile range.
*Except where noted otherwise.

Table 4. Surgical outcomes of a 5:1 propensity-matched cohort of patients who underwent primary total gastrectomy and those who underwent completion total gastrectomy

Outcome	Group; no. (%) of patients*		p value
	Primary total n = 45	Completion total n = 9	
Any complication	20 (44)	4 (44)	1.0
Clavien–Dindo classification grade			
I	3 (7)	1 (11)	0.03
II	9 (20)	0 (0)	
III-a	7 (16)	1 (11)	
III-b	0 (0)	2 (22)	
V	1 (2)	0 (0)	
Length of hospital stay, d, median (IQR)	9 (6–19)	7 (7–9)	0.5

IQR = interquartile range.
*Except where noted otherwise.

Table 5. Oncologic outcomes of full cohort

Outcome	Group		p value
	Primary total n = 55	Completion total n = 9	
Recurrence over 5 yr, no. (%) of patients	33 (60)	3 (33)	0.3
Time to recurrence, mo, median (IQR)	12 (5–24)	10 (8–26)	0.9
Estimated 5-yr disease-free survival rate (95% CI)	0.28 (0.17–0.46)	0.58 (0.30–1.00)	0.3
Death over 5 yr, no. (%) of patients	30 (54)	5 (56)	1.0
Time to death, mo, median (IQR)	19 (10–36)	22 (9–26)	0.8
Estimated overall 5-yr survival rate (95% CI)	0.34 (0.21–0.53)	0.44 (0.21–0.92)	0.8

CI = confidence interval; IQR = interquartile range.

(Clavien–Dindo classification grade II or higher). These complication rates are similar to those reported in other studies, 25%–50%.^{25–27} We attribute these variations in outcome to differences in volume and experience between different groups publishing their results. There was a significantly higher rate of reoperation following CTG for GRC than PTG for sporadic gastric cancer. This may be

explained by a higher complexity of cases owing to previous abdominal surgery, more challenging dissection planes and altered anatomy, which can all contribute to greater perioperative risk. In our sample, the reasons for reoperation included bleeding, bile leak and wound dehiscence.

Our finding of a significantly smaller number of lymph nodes retrieved during CTG than during PTG is consistent with other studies showing that prior partial gastrectomy and lymphadenectomy results in retrieval of fewer perigastric lymph nodes on completion gastrectomy.^{28,29} A greater proportion of lymph nodes are found to be positive in sporadic gastric cancer than in GRC, a difference that trended toward but did not reach significance in our sample. This may reflect different patterns of metastasis in GRC owing to altered lymphatic anatomy, which favours direct extension as a means of primary metastasis.^{23,30,31} Furthermore, it suggests that the lymph node ratio, a tool proposed by Deng and colleagues^{32,33} as a suitable prognosticator in node-positive gastric cancer, may not be applicable to GRC as a separate entity.

We estimated median overall survival of 25 and 26 months following CTG and PTG, respectively, which compares favourably to findings in other studies, 13–17 months.^{12,20} We were unable to show significant differences in 5-year disease-free survival or overall survival in

Table 6. Oncologic outcomes of a 5:1 propensity-matched cohort of patients who underwent primary total gastrectomy and those who underwent completion total gastrectomy

Outcome	Group		<i>p</i> value
	Primary total <i>n</i> = 45	Completion total <i>n</i> = 9	
Recurrence over 5 yr, no. (%) of patients	26 (58)	3 (33)	0.3
Time to recurrence, mo, median (IQR)	12 (6–24)	10 (8–26)	0.9
Estimated 5-yr disease-free survival rate (95% CI)	0.28 (0.16–0.50)	0.58 (0.30–1.00)	0.4
Death over 5 yr, no. (%) of patients	24 (53)	5 (56)	1.0
Time to death, mo, median (IQR)	20 (9–37)	22 (9–26)	0.8
Estimated overall 5-yr survival rate (95% CI)	0.33 (0.20–0.56)	0.44 (0.21–0.92)	0.7

CI = confidence interval; IQR = interquartile range.

Fig. 1. Kaplan–Meier survival curves for disease-free survival in 5:1 propensity-matched cohort of patients who underwent primary total gastrectomy and those who underwent completion total gastrectomy.

Fig. 2. Kaplan-Meier curves for overall survival in 5:1 propensity-matched cohort of patients who underwent primary total gastrectomy and those who underwent completion total gastrectomy.

patients following CTG and PTG. The median follow-up duration was 21 months.^{11,34} This caused many patients to be censored out of the survival analyses early on and reduced our study's ability to discriminate survival differences between the 2 groups. Our rates of 5-year disease-free survival and overall survival in the CTG and PTG groups (28% and 58%, and 33% and 44%, respectively) are similar to reported values of 20%–30% for CTG and 25%–40% for sporadic gastric cancer.^{31,35}

Limitations

This study has important limitations. First, the small number of patients within either group limited the study's power to reject the null hypothesis. In addition, a distinction should be made between GRC in patients with remote partial gastrectomy for benign ulcer disease and in those with prior gastric cancer. Initial treatment and pathologic characteristics of the latter subgroup were not available, and therefore these patients had to be excluded. In addition, certain variables such as ethnicity, which has been associated with disparities in gastric cancer outcomes,³⁶ were not collected as part of the prospectively maintained database. In our sample, 14% (9/64) of patients had undergone prior partial gastrectomy. A prevalence of prior gastric surgery of 5%–7% among new cases of gastric cancer

has been reported.^{11,13,31} This apparent discrepancy can be explained by our sampling method. When we consider the quotient of patients with gastric cancer and prior gastric surgery for benign disease divided by all patients who underwent partial or total gastrectomy for proven gastric cancer, we find 4% (9/254). When we consider the quotient of patients with gastric cancer and prior gastric surgery for malignancy divided by all patients who underwent partial or total gastrectomy for proven gastric cancer, we also find 4% (10/254). Furthermore, this does not account for the patients who received palliative treatment because of advanced unresectable disease. Finally, we are unable to comment on whether prior partial gastrectomy is an independent risk factor for subsequent development of gastric cancer, as this study was not designed to answer that question. Nevertheless, an association between partial gastrectomy and development of nongastric cancer such as pancreatic or colon cancer has been reported.^{34,37,38}

CONCLUSION

We present our findings as preliminary results that will require ongoing follow-up to discern the true differences in long-term outcomes between CTG and PTG for gastric adenocarcinoma. Despite various contradictory claims in the literature regarding the outcomes associated with

CTG for GRC, we support the view that early aggressive surgical management is the preferred approach for treatment of this entity, as this results in no significant differences in surgical or oncologic outcomes compared to total gastrectomy for sporadic gastric cancer.

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