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Review Article

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Function Preserving Gastrectomy and Quality of Life

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ABSTRACT

Advances in gastric cancer screening have enabled earlier detection, shifting the focus of treatment toward preserving patients' quality of life (QoL). Function-preserving gastrectomy (FPG), including pylorus-preserving gastrectomy, proximal gastrectomy, and sentinel node navigation surgery, represents a paradigm shift in the surgical management of early gastric cancer. These techniques aim to balance oncological safety with the preservation of gastric function, mitigating postgastrectomy syndromes such as dumping syndrome, bile reflux, and nutritional deficiencies. QoL assessment tools, including EORTC QLQ-STO22, KOQUSS-40, and PGSAS-45, have become integral for evaluating patient-reported outcomes, providing insights into physical, emotional, and functional recovery. Although current evidence underscores the benefits of FPG, most studies are limited to East Asia, highlighting the need for multinational trials to validate these findings globally. FPG has demonstrated comparable short- and long-term oncological outcomes to conventional gastrectomy. Enhanced nutritional recovery and reduced gastrointestinal sequelae make FPG increasingly attractive. However, its widespread adoption is challenged by technical complexity, resource intensity, and the need for adequate surgical experience. The integration of advanced technologies, such as robotic surgery and artificial intelligence, coupled with personalized approaches, is expected to further optimize FPG outcomes. This review underscores the critical role of standardized QoL assessments, collaborative research, and technological innovations in advancing FPG as a cornerstone of patient-centered gastric cancer care.

Keywords: Gastrectomy; Early gastric cancer; Quality of life; Patient reported outcome measures; Surgical outcomes

INTRODUCTION

Gastric cancer remains a major global health challenge, ranking as fifth in terms of both incidence and cancer-related mortality worldwide [1]. East Asia, particularly South Korea, Japan, and China, bears the highest burden of gastric cancer due to dietary, genetic, and environmental factors [2-5]. In South Korea, early detection through nationwide screening programs has increased the identification of early gastric cancer (EGC), contributing to improved survival rates [6-9]. As a result, the emphasis of gastric cancer treatment

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has shifted from solely improving survival to optimizing patients' quality of life (QoL). Nonetheless, traditional surgical treatments, such as total or distal gastrectomy, often result in significant postgastrectomy syndromes, including dumping syndrome, bile reflux, and nutritional deficiencies, which adversely affect patients' QoL [10-16].

The rise of minimally invasive surgical techniques and the concept of function-preserving gastrectomy (FPG) mark a paradigm shift in the treatment of EGC [17,18]. These techniques, including pylorus-preserving gastrectomy (PPG), proximal gastrectomy (PG), and sentinel node navigation surgery (SNNS), aim to maintain gastric function while ensuring oncological safety. FPG, in comparison to traditional radical gastrectomy, shows no increase in postoperative morbidity and mortality while addressing patients' increasing demand for better QoL [19-21].

A growing body of evidence underscores the importance of QoL as a critical endpoint in clinical trials and treatment planning for gastric cancer. Assessment tools like the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 and QLQ-STO22, along with the KOrean QUality of life in Stomach cancer patients Study group-40 (KOQUSS-40) and Postgastrectomy Syndrome Assessment Scale-45 (PGSAS-45), have become integral to evaluating the physical, emotional, and social impacts of gastrectomy [22-25]. Incorporating these tools into practice allows clinicians to make informed decisions about surgical approaches based on patient-reported outcomes.

This review aims to provide a comprehensive overview of QoL assessment tools, describe FPG techniques, and explore their clinical outcomes and associated challenges. It also highlights the importance of standardized QoL assessment in advancing gastric cancer care and emphasizes the need for ongoing innovation in surgical and perioperative management to enhance patient-centered outcomes.

QoL ASSESSMENT TOOLS

Assessing QoL has become an essential component in evaluating the outcomes of gastric cancer surgery, particularly in the context of FPG techniques. Health-related quality of life (HRQOL), a subset of QoL, encompasses symptoms, functioning, and overall health perceptions [26,27]. It includes various dimensions of a patient's well-being, including physical, psychological, social, and functional aspects, which are significantly influenced by the type and extent of surgical intervention. Accurate assessment of these domains requires the use of validated tools tailored to the specific challenges faced by gastric cancer patients. **Table 1** summarizes the key characteristics of the most commonly used QoL assessment tools in this patient population.

Gastric cancer-related tools

EORTC QLQ-C30 and QLQ-STO22

The EORTC QLQ-C30 is one of the most widely used instruments for evaluating cancer-related QoL [24,28]. This tool assesses five functional domains—physical, role, cognitive, emotional, and social functioning—along with global health and symptom scales. It provides a comprehensive view of the impact of cancer treatment on a patient's life. For gastric cancer-specific concerns, the QLQ-C30 is often paired with the EORTC QLQ-STO22. Introduced in 2001, the QLQ-STO22 is available in 60 languages and comprises 22 questions addressing

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Table 1. Characteristics of various QoL assessment tools

Tool	Purpose	Year of development	Region of origin	Available languages	Number of items	Domains
EORTC STO-22 [24]	Measure QoL in gastric cancer patients	2001	Europe	60: Arabic, Chinese, Dutch, English, French, German, Greek, Italian, Japanese, Korean, Malay, Portuguese, Russian, Spanish, Swedish, Tagalog, Turkish, etc.	22	Dysphagia, pain/discomfort, eating restrictions, upper gastrointestinal symptoms, specific emotional problems, and three specific items
FACT-Ga [32]	Measure QoL in gastric cancer patients	2011	United States	28: Chinese, Dutch, English, French, German, Italian, Japanese, Korean, Malay, Portuguese, Russian, Spanish, Tagalog, Turkish, Vietnamese, etc.	19	Physical, social, emotional, and functional well-being, with added focus on gastric cancer-specific concerns
KOQUSS-40 [23]	Measure QoL in patients who underwent gastrectomy	2018	South Korea	3: English, Italian, Korean	40	General quality of life, indigestion, dysphagia, reflux, dumping syndrome, bowel habit change, constipation, psychological factors, worry about cancer, scar problems, and financial problems
PGSAS-45 [35]	Measure QoL in patients who underwent gastrectomy	2013	Japan	1: Japanese	45	Bile regurgitation, sense of food sticking, post prandial fullness, early satiation, lower abdominal pain, dumping symptom, dietary intake, work, and satisfaction with daily life

QoL = quality of life; EORTC QLQ-STO22 = European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Stomach; FACT-Ga = Functional Assessment of Cancer Therapy-Gastric; KOQUSS-40 = KOrean QUality of life in Stomach cancer patients Study group-40; PGSAS-45 = Postgastrectomy Syndrome Assessment Scale-45.

dysphagia, pain/discomfort, eating restrictions, upper gastrointestinal symptoms, specific emotional problems, and three specific items: dry mouth, body image, and hair loss [22,23,29-31]. The QLQ-STO22 is particularly effective in capturing the unique challenges faced by patients undergoing gastric surgery, such as post-gastrectomy symptoms and anxiety related to eating.

Functional Assessment of Cancer Therapy-Gastric (FACT-Ga)

The FACT-Ga is another validated QoL tool specifically designed for gastric cancer patients [32-34]. Developed in the United States in 2011, the FACT-Ga was derived from the Functional Assessment of Cancer Therapy-General, with an additional gastric cancer-specific module consisted of 19 items to address gastrointestinal symptoms, appetite loss, and weight changes. It is available in 28 languages and evaluates physical, social, emotional, and functional well-being, with added focus on gastric cancer-specific concerns. FACT-Ga is particularly valued for its inclusion of emotional and social factors, making it complementary to tools like the EORTC QLQ-STO22, which focus more on physical symptoms. Its user-friendly design and high reliability have made it a popular choice in clinical trials, effectively capturing the multifaceted impact of surgical interventions on patient outcomes.

Postgastrectomy syndrome-related tools

KOQUSS-40

In South Korea, the KOQUSS-40 was developed in 2018 to address specific postoperative issues relevant to gastric cancer patients [25]. This tool evaluates QoL with 40 questions across 11 domains including general QoL, indigestion, dysphagia, reflux, dumping syndrome, bowel habit change, constipation, psychological factors, worry about cancer, scar problems, and financial problems. The KOQUSS-40 was first validated for use in Korean populations and tailored to the cultural and clinical nuances of gastric cancer management in the region, and then translated to English and Italian. It complements global tools like the QLQ-C30 by focusing more specifically on symptoms such as dyspepsia, reflux, and dietary restrictions.

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PGSAS-45

Another notable instrument is the PGSAS-45, which was developed in 2013 in Japan to comprehensively assess post-gastrectomy syndrome [35]. Provided in Japanese and English, this tool consists of 45 items, which assess bile regurgitation, sense of food sticking, post prandial fullness, early satiation, lower abdominal pain, dumping symptom, dietary intake, work, and satisfaction with daily life. The PGSAS-45 has been instrumental in comparing outcomes of different surgical approaches, such as total gastrectomy (TG) vs. distal gastrectomy (DG), TG vs. PG, and PPG vs. Billroth-I DG, providing valuable insights into their relative impacts on patient well-being [36-38].

The choice of QoL assessment tools depends on the goals of the study or clinical practice. While global tools like the EORTC QLQ-C30 provide broad applicability across various cancer types, gastric cancer-specific instruments such as the QLQ-STO22, KOQUSS-40, and PGSAS-45 offer more detailed insights into the unique challenges faced by gastric cancer patients. Integrating these tools into clinical practice enables a more nuanced understanding of treatment outcomes, helping clinicians tailor interventions to individual patient needs.

Beyond tool selection, cultural and linguistic validation remains a critical factor in ensuring the reliability of QoL assessments. Validated translations, such as the Korean versions of the EORTC QLQ-C30 and QLQ-STO22 have undergone thorough forward and backward translation processes to ensure their relevance and accuracy in capturing patient experiences [10,28]. Similarly, the KOQUSS-40 was designed specifically to address regional differences in dietary habits, healthcare systems, and patient expectations [25].

QoL assessment in gastric cancer surgery has evolved significantly, with a growing emphasis on patient-reported outcomes. The integration of validated, culturally adapted tools into both clinical trials and routine practice ensures that the full spectrum of patient experiences is captured, enabling more patient-centered care and guiding the development of surgical techniques and postoperative management strategies. As FPG techniques continue to advance, robust QoL assessment will remain central to evaluating their success and informing clinical decision-making.

METHODS OF FUNCTION PRESERVING GASTRECTOMY

FPG techniques aim to balance oncological safety with the preservation of gastric function and an improvement in postoperative QoL. These approaches are especially relevant in EGC, where the likelihood of lymph node metastasis is relatively low, and complete resection can often be achieved without extensive lymphadenectomy. Here, we detail the specific indications, benefits, and challenges of three primary FPG methods: PPG, PG, and SNNS (**Table 2**, **Fig. 1**).

Table 2. Comparison of function-preserving gastrectomy methods

Method	Indication	Advantages	Challenges
Pylorus-preserving gastrectomy	Middle third EGC	Lower incidence of dumping syndrome, bile reflux, gallstones; preserves nutritional status	Gastric stasis, technical complexity
Proximal gastrectomy	Upper third EGC	Reduced vitamin B12 dependency; improved QoL with double-tract reconstruction	Specialized reconstruction needed
Sentinel node navigation surgery	cT1N0 tumor <4 cm in diameter	Minimally invasive; improved QoL	Prolonged operation time, technical complexity, risk of false-negative frozen biopsy results, radiation exposure in case of radioisotope use

EGC = early gastric cancer; QoL = quality of life.

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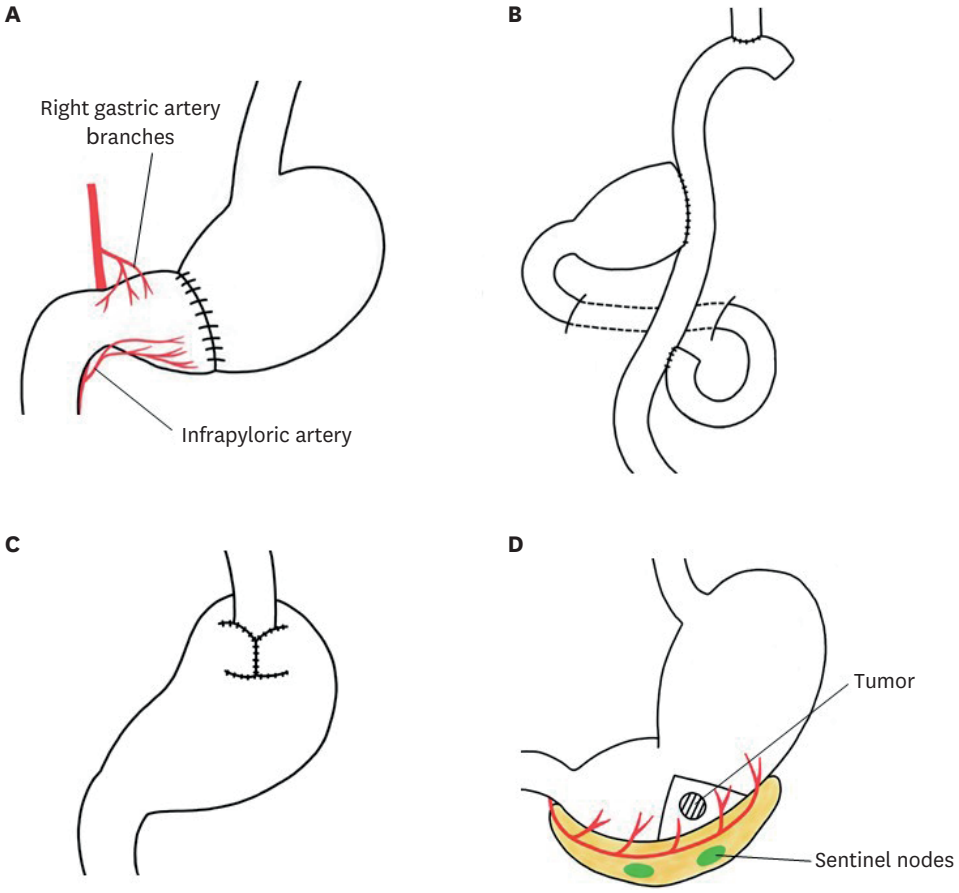

Fig. 1. Different FPG methods.
(A) Pylorus-preserving gastrectomy. (B) Proximal gastrectomy with double-tract reconstruction. (C) Proximal gastrectomy with double-flap technique. (D) Sentinel node navigation surgery (wedge resection).

PPG

PPG is recommended for EGC located in the middle third of the stomach [39]. It preserves the pylorus, infrapyloric vessels, and hepatic branch of the vagus nerve to reduce bile reflux and dumping syndrome [19]. According to the KLASS-04 trial, PPG achieves comparable short- and long-term oncological outcomes to standard DG with additional benefits in nutritional recovery [40,41]. Although complication like gastric stasis may occur, they are generally manageable through dietary adjustments or endoscopic interventions [42-44].

PG

PG is indicated for EGC in the upper third of the stomach [39]. This method has gained attention due to advances in reconstruction techniques, including esophagogastrostomy, double-flap technique (DFT), gastric tube reconstruction, jejunal interposition, and double-tract reconstruction (DTR) [45,46]. Among these, DTR is particularly effective in mitigating complications like gastroesophageal reflux and nutritional deficiencies [47,48]. The KLASS-05 trial demonstrated that by maintaining part of the stomach's functionality, PG with DTR helps reduce the need for vitamin B12 supplementation and minimizes anemia-related issues compared to TG [49,50]. Another reconstruction method, the DFT, has shown advantages over TG in terms of morbidity, hospital stay, and nutritional status [51]. Nonetheless, laparoscopic PG-DFT requires more complex intracorporeal suturing skills, resulting in prolonged operation time [52,53].

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SNNS

SNNS minimizes the extent of lymphadenectomy in EGC by identifying and resecting sentinel nodes. To date, SNNS has primarily been performed on cT1N0 tumors less than 4 cm in diameter [54-57]. Based on the sentinel node basin theory, this technique employs either dual tracer injection with a radioisotope and dye or near-infrared indocyanine green (ICG) fluorescence for intraoperative mapping [58-61]. These methods guide the necessity of extensive lymph node dissection. The SENORITA trial confirmed the superiority in QoL outcomes of SNNS compared to standard gastrectomy [21,62]. Despite these advantages, the procedure requires longer operation time and depends on reliable intraoperative tools and techniques, which may limit its accessibility and widespread adoption. Furthermore, the risk of false-negative frozen biopsy results remains a concern.

COMPARATIVE OUTCOMES

Surgical safety

FPG demonstrates comparable oncological outcomes to conventional gastrectomy, including DG and TG, particularly for EGC. Several studies report that morbidity and mortality rates are similar between FPG and standard approaches [43,48,63,64].
For instance, the KLASS-04 trial, which compared laparoscopic PPG with laparoscopic DG, showed no significant differences in postoperative complications or recurrence rates, underscoring the safety of PPG [40,41]. Furthermore, a systematic review which analyzed 21 studies comparing PPG and DG, further substantiated that PPG demonstrates similar long-term survival and recurrence rates to DG, despite the reduced extent of lymphadenectomy [65].

Similarly, the KLASS-05 trial highlighted the non-inferiority of laparoscopic PG with DTR compared to laparoscopic TG in terms of oncological safety [49,50]. Additionally, PG with DFT has been associated with lower morbidity rates and shorter hospital stay compared to laparoscopic TG, further supporting the surgical safety of PG [51].

For SNNS, previous studies have suggested favorable long-term survival rates when applied to carefully selected patients, emphasizing the need for precise execution and thorough postoperative follow-up [55,66,67]. The SENORITA trial showed that SNNS offers comparable rates and severity of complications to standard gastrectomy [68]. However, the trial could not demonstrate the non-inferiority of SNNS in terms of 3-year disease-free survival, raising questions about its reliability in completely preventing recurrence [69]. Despite comparable disease-specific and overall survival outcomes with appropriate treatment of recurrences, there is still notable controversy in the literature about the oncological safety of SNNS [70,71]. Current prospective multicenter phase III trials in Japan and China (ClinicalTrials.gov, NCT05160753) aim to investigate the safety and efficacy of SNNS [72]. These efforts will be pivotal in determining whether SNNS can be widely adopted as a reliable alternative to conventional approaches while maintaining stringent oncological standards.

Nutritional and functional benefits

Preservation of gastric function is a key advantage of FPG. Patients who undergo FPG maintain higher levels of serum albumin, hemoglobin, and body weight compared to those who undergo more extensive resections [38,73,74].

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By retaining critical anatomical structures such as the pylorus and antrum in PPG and the distal half of the stomach in PG, these techniques significantly reduce the incidence of nutritional deficiencies and gastrointestinal complications. Multiple studies showed that PPG is associated with less gallstone formation, lower rates of dumping syndrome, and reduced bile reflux compared to DG, as the preserved pylorus regulates gastric emptying and prevents reflux [19,38,44,73]. A meta-analysis reported that while PPG showed fewer harvested lymph nodes and more delayed gastric emptying, it resulted in significantly lower incidence of anastomosis leakage, early dumping syndrome, gastritis, and bile reflux [65]. Additionally, PPG facilitated better recovery of total protein, albumin, hemoglobin, and weight.

Similarly, PG with DTR minimizes the risk of severe reflux esophagitis, a common complication of esophagogastrostomy, resulting in better postoperative QoL and body weight maintenance [75,76]. Prior research demonstrated that PG with DTR shows better nutrient absorption, reducing the need for lifelong vitamin B12 supplementation and leading to higher hemoglobin levels [50,63,77]. PG with DFT also shows superior outcomes compared to TG in terms of maintaining postoperative nutritional status [51].

SNNS minimizes the extent of lymphadenectomy, reducing surgical trauma and preserving the lymphatic system, which is essential for nutrient absorption and immune function. A secondary analysis of the SENORITA trial reported that patients treated with SNNS experienced fewer gastrointestinal symptoms, such as indigestion and reflux, compared to those undergoing standard gastrectomy [78]. The SNNS group had improved nutritional outcomes, including higher body mass index and levels of hemoglobin, albumin, and protein. However, the effectiveness of SNNS depends on accurate sentinel node detection and meticulous surgical technique to ensure both functional and oncological benefits. Continued refinement of this procedure and careful patient selection are critical to maximizing its advantages.

Patient-reported QoL

QoL assessment tools such as the EORTC QLQ-C30 and QLQ-STO22 have shown that patients undergoing FPG experience fewer eating restrictions, less meal-related anxiety, and better social integration compared to those undergoing standard gastrectomy [73,79].

Specifically, PPG has demonstrated superior outcomes in managing specific symptoms like early satiety, diarrhea, reflux, emotional functions, and taste problems [38,73,80,81]. By preserving the pyloric sphincter, PPG allows for a more gradual and regulated passage of food, reducing the rapid transit symptoms often observed in other types of gastrectomy [19]. However, some studies failed to confirm the superiority of PPG. A Japanese prospective multi-institutional study found no significant difference between PPG and DG in terms of postoperative body weight changes and QoL [82].

Meanwhile, patients treated with PG often report higher satisfaction with their ability to consume regular meals, experience fewer symptoms of gastrointestinal distress, and maintain normal work capacity than those treated with TG [37,83]. Despite these benefits, other studies showed that PG has no advantage over TG regarding patients' overall QoL [50,84]. The QoL outcomes of PG remain inconsistent, partly due to the fact that different anastomosis methods have varying effects on patient-reported outcomes.

SNNS has been shown to enhance QoL compared to conventional DG according to both QLQ-C30 and QLQ-STO22 scales [85]. The SENORITA trial further highlighted the QoL benefits

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of SNNS, demonstrating that SNNS patients experienced better physical functioning and reduced levels of fatigue and pain compared to those undergoing standard gastrectomy [78].

In summary, FPG techniques consistently offer comparable oncological safety to conventional gastrectomy while providing distinct advantages in recovery, nutritional status, and QoL. The ability to maintain gastric function and minimize complications makes FPG an increasingly preferred option for EGC. However, the reported outcomes are not universally consistent. Studies highlighting the lack of significant QoL differences between FPG and conventional gastrectomy underscore the necessity of individualized patient selection. Additionally, the success of FPG depends heavily on surgeon expertise, precise surgical execution, and careful postoperative management. These considerations emphasize the need for a tailored, multidisciplinary approach to ensure that FPG achieves its full potential in balancing oncological safety with functional and QoL outcomes.

CHALLENGES AND LIMITATIONS

Patient selection and indications

Effective patient selection is crucial for FPG, as these techniques are best suited for EGC with minimal lymph node involvement. The SENORITA trial reported that 7.4% of patients were preoperatively underdiagnosed, with those initially staged as cT1 subsequently identified as pT2 or higher [68]. Thus, accurate preoperative evaluation is essential to avoid errors in staging that could result in overtreatment or insufficient oncological control. Key diagnostic modalities include endoscopic ultrasound and stomach-specific computed tomography protocols, which provide details on tumor depth and nodal status [86,87]. Endoscopic clipping can assist in precise tumor localization [88], with PPG indicated for middle third tumors and PG for upper third tumors. Intraoperative frozen biopsy plays a vital role to secure safe resection margins, ensuring complete tumor removal while preserving as much functional tissue as possible [89].

Postoperative management

Although FPG demonstrates comparable complications relative to traditional gastrectomy, certain procedure-specific challenges necessitate careful postoperative management. For example, delayed gastric emptying following PPG, often due to pyloric stenosis, can be effectively treated with balloon dilatation or stent insertion [40]. In PG after DFT, reflux esophagitis may require proton pump inhibitors or dietary modifications to alleviate symptoms [90]. Nutritional deficiencies, including vitamin B12 and iron, may persist after PPG or PG, necessitating long-term supplementation and close follow-up. Meanwhile, the SENORITA trial showed that anastomotic or gastric stenosis rates were higher in the SNNS group, highlighting the importance of preserving adequate blood supply to the remnant stomach during surgery [68].

Technical complexity and surgeon expertise

FPG is technically demanding, requiring advanced skills and abundant experience to ensure successful outcomes. In PPG, meticulous attention is needed to preserve the infrapyloric vessels and hepatic branch of the vagus nerve. In PG with DTR, factors such as the size of the remnant stomach, the length of interposed jejunum (≤10 cm), and the length of the gastrojejunum anastomosis (>6 cm) were reported to contribute to better postoperative QoL [91]. SNNS is particularly time-consuming and labor-intensive compared to conventional

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gastrectomy because steps such as tracer injection, sentinel basin detection, sentinel node harvesting, and intraoperative frozen section analysis significantly increase the complexity and duration of the procedure [68]. Such demands for specialized equipment, expertise, and resources limits the accessibility of FPG, posing a barrier to its widespread adoption.

Limited long-term data

While short-term outcomes of FPG are well-documented, there is a lack of robust long-term data on oncological safety and QoL across diverse populations. EGC patients generally achieve high survival rates following standard gastrectomy, and these outcomes must not be compromised by recurrence or mortality risks associated with FPG. Until further research provides comprehensive evidence on the long-term oncological safety of FPG, careful application should be limited to well-selected patients. Currently, most studies originate from East Asia, where gastric cancer incidence is high, and surgical expertise is well-established. However, this regional concentration of data limits the generalizability of findings to other populations, particularly in Western countries with differing patient demographics, healthcare systems, and dietary habits. The lack of multi-national, large-scale research underscores the urgent need for collaborative studies to validate FPG's safety and QoL benefits globally.

In summary, overcoming these challenges requires focused training programs, standardized surgical protocols, and equitable access to advanced resources. Further research is necessary to refine FPG techniques and validate their benefits worldwide. Expanding the global evidence base through multi-center, multi-national collaborations will be pivotal in establishing FPG as a safe, effective, and universally applicable approach to managing EGC.

FUTURE DIRECTIONS

Robotic systems hold potential to refine FPG procedures, offering enhanced precision and consistency. Robotic surgery, with its superior visualization and dexterity, can address challenges in complex reconstructions often required during FPG [92,93]. Expanding robotic training programs and reducing costs will facilitate broader adoption.

Personalized approaches to patient selection and perioperative management will help optimize treatment plans by tailoring surgeries to individual patient profiles [94]. Additionally, real-time imaging and improved sentinel node detection systems will enhance procedural accuracy.

Expanding the use of tools like KOQUSS-40 and PGSAS-45 to diverse populations through global validation studies is critical. Incorporating patient-reported outcomes into routine practice can provide deeper insights into long-term recovery, enabling healthcare providers to better address patient needs and refine treatment strategies [95].

Finally, multinational trials and training programs are essential to confirm the safety and efficacy of FPG across different populations. Large-scale international collaborations will help bridge regional differences in patient demographics, healthcare infrastructure, and surgical expertise. Establishing standardized training and certification programs will ensure consistent implementation and better outcomes.

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By leveraging technological advances, focusing on personalized care, and expanding global research, FPG can become a widely adopted standard for gastric cancer treatment, prioritizing both survival and QoL.

CONCLUSIONS

FPG represents a significant shift in the surgical management of EGC, offering patients the dual benefits of oncological safety and enhanced postoperative QoL. Techniques such as PPG, PG, and SNNS have demonstrated their advantages in preserving gastric function, minimizing complications, and improving nutritional outcomes compared to conventional gastrectomy. Despite its advantages, FPG poses challenges, including technical complexity, variability in access, reliance on accurate patient selection, and effective postoperative management. Validated QoL tools like the EORTC QLQ-STO22, KOQUSS-40, and PGSAS-45 play a critical role in assessing patient-reported outcomes. While short-term benefits of FPG are well-documented, robust long-term data across diverse populations remain limited. Integrating advanced technologies, improving personalized care, expanding global validation of QoL tools, and incorporating patient-reported outcomes into routine practice will further refine treatment strategies and improve patient-centered care in FPG.

REFERENCES

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2024;74:229-263. PUBMED | CROSSREF
2. Park SH, Kang MJ, Yun EH, Jung KW. Epidemiology of gastric cancer in Korea: trends in incidence and survival based on Korea Central Cancer Registry Data (1999-2019). J Gastric Cancer 2022;22:160-168. PUBMED | CROSSREF
3. Cai H, Sobue T, Kitamura T, Ishihara J, Nanri A, Mizoue T, et al. Low-carbohydrate diet and risk of cancer incidence: the Japan Public Health Center-based prospective study. Cancer Sci 2022;113:744-755. PUBMED | CROSSREF
4. Dalmartello M, Turati F, Zhang ZF, Lunet N, Rota M, Bonzi R, et al. Allium vegetables intake and the risk of gastric cancer in the Stomach cancer Pooling (StoP) Project. Br J Cancer 2022;126:1755-1764. PUBMED | CROSSREF
5. Lee YC, Chiang TH, Chiu HM, Su WW, Chou KC, Chen SL, et al. Screening for *Helicobacter pylori* to prevent gastric cancer: a pragmatic randomized clinical trial. JAMA 2024;332:1642-1651. PUBMED | CROSSREF
6. Leung WK, Wu MS, Kakugawa Y, Kim JJ, Yeoh KG, Goh KL, et al. Screening for gastric cancer in Asia: current evidence and practice. Lancet Oncol 2008;9:279-287. PUBMED | CROSSREF
7. Ahn HS, Lee HJ, Yoo MW, Jeong SH, Park DJ, Kim HH, et al. Changes in clinicopathological features and survival after gastrectomy for gastric cancer over a 20-year period. Br J Surg 2011;98:255-260. PUBMED | CROSSREF
8. Jun JK, Choi KS, Lee HY, Suh M, Park B, Song SH, et al. Effectiveness of the Korean National Cancer Screening Program in reducing gastric cancer mortality. Gastroenterology 2017;152:1319-1328.e7. PUBMED | CROSSREF
9. Suh YS, Lee J, Woo H, Shin D, Kong SH, Lee HJ, et al. National cancer screening program for gastric cancer in Korea: nationwide treatment benefit and cost. Cancer 2020;126:1929-1939. PUBMED | CROSSREF
10. Bae JM, Kim S, Kim YW, Ryu KW, Lee JH, Noh JH, et al. Health-related quality of life among disease-free stomach cancer survivors in Korea. Qual Life Res 2006;15:1587-1596. PUBMED | CROSSREF
11. McCall MD, Graham PJ, Bathe OF. Quality of life: a critical outcome for all surgical treatments of gastric cancer. World J Gastroenterol 2016;22:1101-1113. PUBMED | CROSSREF
12. Yu W, Park KB, Chung HY, Kwon OK, Lee SS. Chronological changes of quality of life in long-term survivors after gastrectomy for gastric cancer. Cancer Res Treat 2016;48:1030-1036. PUBMED | CROSSREF

https://doi.org/10.5230/jgc.2025.25.e7

13. Davis JL, Ripley RT. Postgastrectomy syndromes and nutritional considerations following gastric surgery. Surg Clin North Am 2017;97:277-293. PUBMED | CROSSREF
14. Hu Y, Vos EL, Baser RE, Schattner MA, Nishimura M, Coit DG, et al. Longitudinal analysis of quality-of-life recovery after gastrectomy for cancer. Ann Surg Oncol 2021;28:48-56. PUBMED | CROSSREF
15. Schütte K, Schulz C, Middelberg-Bisping K. Impact of gastric cancer treatment on quality of life of patients. Best Pract Res Clin Gastroenterol 2021;50-51:101727. PUBMED | CROSSREF
16. Wang CJ, Suh YS, Lee HJ, Park JH, Park SH, Choi JH, et al. Postoperative quality of life after gastrectomy in gastric cancer patients: a prospective longitudinal observation study. Ann Surg Treat Res 2022;103:19-31. PUBMED | CROSSREF
17. Hiki N, Nunobe S, Kubota T, Jiang X. Function-preserving gastrectomy for early gastric cancer. Ann Surg Oncol 2013;20:2683-2692. PUBMED | CROSSREF
18. Hiramatsu Y, Kikuchi H, Takeuchi H. Function-preserving gastrectomy for early gastric cancer. Cancers (Basel) 2021;13:6223. PUBMED | CROSSREF
19. Oh SY, Lee HJ, Yang HK. Pylorus-preserving gastrectomy for gastric cancer. J Gastric Cancer 2016;16:63-71. PUBMED | CROSSREF
20. Yamasaki M, Takiguchi S, Omori T, Hirao M, Imamura H, Fujitani K, et al. Multicenter prospective trial of total gastrectomy versus proximal gastrectomy for upper third cT1 gastric cancer. Gastric Cancer 2021;24:535-543. PUBMED | CROSSREF
21. Booka E, Takeuchi H. Recent advances in sentinel node navigation surgery for early gastric cancer. J Gastric Cancer 2023;23:159-170. PUBMED | CROSSREF
22. Vickery CW, Blazeby JM, Conroy T, Arraras J, Sezer O, Koller M, et al. Development of an EORTC disease-specific quality of life module for use in patients with gastric cancer. Eur J Cancer 2001;37:966-971. PUBMED | CROSSREF
23. Blazeby JM, Conroy T, Bottomley A, Vickery C, Arraras J, Sezer O, et al. Clinical and psychometric validation of a questionnaire module, the EORTC QLQ-STO 22, to assess quality of life in patients with gastric cancer. Eur J Cancer 2004;40:2260-2268. PUBMED | CROSSREF
24. Giesinger JM, Kieffer JM, Fayers PM, Groenvold M, Petersen MA, Scott NW, et al. Replication and validation of higher order models demonstrated that a summary score for the EORTC QLQ-C30 is robust. J Clin Epidemiol 2016;69:79-88. PUBMED | CROSSREF
25. Eom BW, Lee J, Lee IS, Son YG, Ryu KW, Kim SG, et al. Development and Validation of a Symptom-Focused Quality of Life Questionnaire (KOQUSS-40) for gastric cancer patients after gastrectomy. Cancer Res Treat 2021;53:763-772. PUBMED | CROSSREF
26. van den Boorn HG, Stroes CI, Zwinderman AH, Eshuis WJ, Hulshof MCCM, van Etten-Jamaludin FS, et al. Health-related quality of life in curatively-treated patients with esophageal or gastric cancer: a systematic review and meta-analysis. Crit Rev Oncol Hematol 2020;154:103069. PUBMED | CROSSREF
27. Chung KC, Muthutantri A, Goldsmith GG, Watts MR, Brown AE, Patrick DL. Symptom impact and health-related quality of life (HRQoL) assessment by cancer stage: a narrative literature review. BMC Cancer 2024;24:884. PUBMED | CROSSREF
28. Yun YH, Park YS, Lee ES, Bang SM, Heo DS, Park SY, et al. Validation of the Korean version of the EORTC QLQ-C30. Qual Life Res 2004;13:863-868. PUBMED | CROSSREF
29. Kobayashi D, Kodera Y, Fujiwara M, Koike M, Nakayama G, Nakao A. Assessment of quality of life after gastrectomy using EORTC QLQ-C30 and STO22. World J Surg 2011;35:357-364. PUBMED | CROSSREF
30. Woo A, Fu T, Popovic M, Chow E, Cella D, Wong CS, et al. Comparison of the EORTC STO-22 and the FACT-Ga quality of life questionnaires for patients with gastric cancer. Ann Palliat Med 2016;5:13-21. PUBMED | CROSSREF
31. Rowsell A, Sodergren SC, Vassiliou V, Darlington AS, Guren MG, Alkhaffaf B, et al. Systematic review of health-related quality of life (HRQoL) issues associated with gastric cancer: capturing cross-cultural differences. Gastric Cancer 2022;25:665-677. PUBMED | CROSSREF
32. Garland SN, Pelletier G, Lawe A, Biagioni BJ, Easaw J, Eliasziw M, et al. Prospective evaluation of the reliability, validity, and minimally important difference of the Functional Assessment of Cancer Therapy-Gastric (FACT-Ga) quality-of-life instrument. Cancer 2011;117:1302-1312. PUBMED | CROSSREF
33. Debb SM, Arnold B, Perez B, Cella D. Validation of the FACT-Gastric cancer quality of life questionnaire for use in Spanish-speaking countries. Psychooncology 2011;20:19-27. PUBMED | CROSSREF
34. Zhou HJ, So JB, Yong WP, Luo N, Zhu F, Naidoo N, et al. Validation of the functional assessment of cancer therapy-gastric module for the Chinese population. Health Qual Life Outcomes 2012;10:145. PUBMED | CROSSREF
35. Nakada K, Ikeda M, Takahashi M, Kinami S, Yoshida M, Uenosono Y, et al. Characteristics and clinical relevance of Postgastrectomy Syndrome Assessment Scale (PGSAS)-45: newly developed integrated

questionnaires for assessment of living status and quality of life in postgastrectomy patients. Gastric Cancer 2015;18:147-158. PUBMED | CROSSREF

36. Takahashi M, Terashima M, Kawahira H, Nagai E, Uenosono Y, Kinami S, et al. Quality of life after total vs distal gastrectomy with Roux-en-Y reconstruction: use of the Postgastrectomy Syndrome Assessment Scale-45. World J Gastroenterol 2017;23:2068-2076. PUBMED | CROSSREF
37. Takiguchi N, Takahashi M, Ikeda M, Inagawa S, Ueda S, Nobuoka T, et al. Long-term quality-of-life comparison of total gastrectomy and proximal gastrectomy by Postgastrectomy Syndrome Assessment Scale (PGSAS-45): a nationwide multi-institutional study. Gastric Cancer 2015;18:407-416. PUBMED | CROSSREF
38. Fujita J, Takahashi M, Urushihara T, Tanabe K, Kodera Y, Yumiba T, et al. Assessment of postoperative quality of life following pylorus-preserving gastrectomy and Billroth-I distal gastrectomy in gastric cancer patients: results of the nationwide postgastrectomy syndrome assessment study. Gastric Cancer 2016;19:302-311. PUBMED | CROSSREF
39. Kim TH, Kim IH, Kang SJ, Choi M, Kim BH, Eom BW, et al. Korean Practice Guidelines for Gastric Cancer 2022: an evidence-based, multidisciplinary approach. J Gastric Cancer 2023;23:3-106. PUBMED | CROSSREF
40. Park DJ, Kim YW, Yang HK, Ryu KW, Han SU, Kim HH, et al. Short-term outcomes of a multicentre randomized clinical trial comparing laparoscopic pylorus-preserving gastrectomy with laparoscopic distal gastrectomy for gastric cancer (the KLASS-04 trial). Br J Surg 2021;108:1043-1049. PUBMED | CROSSREF
41. Lee HJ, Kim YW, Park DJ, Han SU, Ryu KW, Kim HH, et al. Laparoscopic pylorus preserving gastrectomy vs distal gastrectomy for early gastric cancer; a multicenter randomized controlled trial (KLASS-04). Ann Surg. Forthcoming 2024. PUBMED | CROSSREF
42. Ikeguchi M, Hatada T, Yamamoto M, Miyake T, Matsunaga T, Fukuda K, et al. Evaluation of a pylorus-preserving gastrectomy for patients preoperatively diagnosed with early gastric cancer located in the middle third of the stomach. Surg Today 2010;40:228-233. PUBMED | CROSSREF
43. Suh YS, Han DS, Kong SH, Kwon S, Shin CI, Kim WH, et al. Laparoscopy-assisted pylorus-preserving gastrectomy is better than laparoscopy-assisted distal gastrectomy for middle-third early gastric cancer. Ann Surg 2014;259:485-493. PUBMED | CROSSREF
44. Xia X, Xu J, Zhu C, Cao H, Yu F, Zhao G. Objective evaluation of clinical outcomes of laparoscopy-assisted pylorus-preserving gastrectomy for middle-third early gastric cancer. BMC Cancer 2019;19:481. PUBMED | CROSSREF
45. Tang HP, Zhu HX, Lu GP, Peng ZQ, Chen ZK, Wang MC. Technical variety of anastomotic techniques used in proximal gastrectomy with double-tract-reconstruction - a narrative review. Langenbecks Arch Surg 2024;409:148. PUBMED | CROSSREF
46. Li B, Wang Y, Li B, Shan F, Li Z. Short-term outcomes and long-term quality of life of reconstruction methods after proximal gastrectomy: a systematic review and meta-analysis. BMC Cancer 2024;24:56. PUBMED | CROSSREF
47. Park JY, Park KB, Kwon OK, Yu W. Comparison of laparoscopic proximal gastrectomy with double-tract reconstruction and laparoscopic total gastrectomy in terms of nutritional status or quality of life in early gastric cancer patients. Eur J Surg Oncol 2018;44:1963-1970. PUBMED | CROSSREF
48. Jung DH, Lee Y, Kim DW, Park YS, Ahn SH, Park DJ, et al. Laparoscopic proximal gastrectomy with double tract reconstruction is superior to laparoscopic total gastrectomy for proximal early gastric cancer. Surg Endosc 2017;31:3961-3969. PUBMED | CROSSREF
49. Hwang SH, Park DJ, Kim HH, Hyung WJ, Hur H, Yang HK, et al. Short-term outcomes of laparoscopic proximal gastrectomy with double-tract reconstruction versus laparoscopic total gastrectomy for upper early gastric cancer: a KLASS 05 randomized clinical trial. J Gastric Cancer 2022;22:94-106. PUBMED | CROSSREF
50. Park DJ, Han SU, Hyung WJ, Hwang SH, Hur H, Yang HK, et al. Effect of laparoscopic proximal gastrectomy with double-tract reconstruction vs total gastrectomy on hemoglobin level and vitamin B12 supplementation in upper-third early gastric cancer: a randomized clinical trial. JAMA Netw Open 2023;6:e2256004. PUBMED | CROSSREF
51. Hayami M, Hiki N, Nunobe S, Mine S, Ohashi M, Kumagai K, et al. Clinical outcomes and evaluation of laparoscopic proximal gastrectomy with double-flap technique for early gastric cancer in the upper third of the stomach. Ann Surg Oncol 2017;24:1635-1642. PUBMED | CROSSREF
52. Shoji Y, Nunobe S, Ida S, Kumagai K, Ohashi M, Sano T, et al. Surgical outcomes and risk assessment for anastomotic complications after laparoscopic proximal gastrectomy with double-flap technique for upper-third gastric cancer. Gastric Cancer 2019;22:1036-1043. PUBMED | CROSSREF
53. Yamashita Y, Tatsubayashi T, Okumura K, Miyamoto T, Ueno K. Modified side overlap esophagogastrostomy after laparoscopic proximal gastrectomy. Ann Gastroenterol Surg 2022;6:594-599. PUBMED | CROSSREF
54. Kim YW, Min JS, Yoon HM, An JY, Eom BW, Hur H, et al. Laparoscopic sentinel node navigation surgery for stomach preservation in patients with early gastric cancer: a randomized clinical trial. J Clin Oncol 2022;40:2342-2351. PUBMED | CROSSREF

55. Kinami S, Nakamura N, Miyashita T, Kitakata H, Fushida S, Fujimura T, et al. Life prognosis of sentinel node navigation surgery for early-stage gastric cancer: outcome of lymphatic basin dissection. World J Gastroenterol 2021;27:8010-8030. PUBMED | CROSSREF
56. Liu N, Niu Z, Niu W, Peng C, Zou X, Sun S, et al. Intraoperative sentinel lymph node mapping guides laparoscopic-assisted distal gastrectomy for distal gastric cancer. Int J Clin Exp Med 2015;8:5760-5766. PUBMED
57. Yaguchi Y, Tsujimoto H, Kumano I, Takahata R, Matsumoto Y, Yoshida K, et al. Sentinel node navigation surgery attenuates the functional disorders in early gastric cancer. Oncol Rep 2012;27:643-649. PUBMED | CROSSREF
58. Fujimura T, Fushida S, Tsukada T, Kinoshita J, Oyama K, Miyashita T, et al. A new stage of sentinel node navigation surgery in early gastric cancer. Gastric Cancer 2015;18:210-217. PUBMED | CROSSREF
59. Hiratsuka M, Miyashiro I, Ishikawa O, Furukawa H, Motomura K, Ohigashi H, et al. Application of sentinel node biopsy to gastric cancer surgery. Surgery 2001;129:335-340. PUBMED | CROSSREF
60. Xiong L, Gazyakan E, Yang W, Engel H, Hünerbein M, Kneser U, et al. Indocyanine green fluorescence-guided sentinel node biopsy: a meta-analysis on detection rate and diagnostic performance. Eur J Surg Oncol 2014;40:843-849. PUBMED | CROSSREF
61. Kitagawa Y, Takeuchi H, Takagi Y, Natsugoe S, Terashima M, Murakami N, et al. Sentinel node mapping for gastric cancer: a prospective multicenter trial in Japan. J Clin Oncol 2013;31:3704-3710. PUBMED | CROSSREF
62. Hur H, Lee YJ, Kim YW, Min JS, Yoon HM, An JY, et al. Clinical efficacy of laparoscopic sentinel node navigation surgery for stomach preservation in patients with early gastric cancer: 5-year results of the SENORITA trial. Ann Surg. Forthcoming 2024. PUBMED | CROSSREF
63. Zhu G, Jiao X, Zhou S, Zhu Q, Yu L, Sun Q, et al. Can proximal gastrectomy with double-tract reconstruction replace total gastrectomy? A meta-analysis of randomized controlled trials and propensity score-matched studies. BMC Gastroenterol 2024;24:230. PUBMED | CROSSREF
64. Katai H, Mizusawa J, Katayama H, Kunisaki C, Sakuramoto S, Inaki N, et al. Single-arm confirmatory trial of laparoscopy-assisted total or proximal gastrectomy with nodal dissection for clinical stage I gastric cancer: Japan Clinical Oncology Group study JCOG1401. Gastric Cancer 2019;22:999-1008. PUBMED | CROSSREF
65. Mao X, Xu X, Zhu H, Ji C, Lu X, Wang B. A comparison between pylorus-preserving and distal gastrectomy in surgical safety and functional benefit with gastric cancer: a systematic review and meta-analysis. World J Surg Oncol 2020;18:160. PUBMED | CROSSREF
66. Park DJ, Park YS, Son SY, Lee JH, Lee HS, Park YS, et al. Long-term oncologic outcomes of laparoscopic sentinel node navigation surgery in early gastric cancer: a single-center, single-arm, phase II trial. Ann Surg Oncol 2018;25:2357-2365. PUBMED | CROSSREF
67. Isozaki H, Matsumoto S, Murakami S. Survival outcomes after sentinel node navigation surgery for early gastric cancer. Ann Gastroenterol Surg 2019;3:552-560. PUBMED | CROSSREF
68. An JY, Min JS, Hur H, Lee YJ, Cho GS, Park YK, et al. Laparoscopic sentinel node navigation surgery versus laparoscopic gastrectomy with lymph node dissection for early gastric cancer: short-term outcomes of a multicentre randomized controlled trial (SENORITA). Br J Surg 2020;107:1429-1439. PUBMED | CROSSREF
69. Liu M, Strong V. Laparoscopic sentinel node navigation surgery for quality of life gains: when is less more? JAMA Surg 2024;159:908-909. PUBMED | CROSSREF
70. Strong VE. Defining the role of laparoscopic gastrectomy for gastric cancer. J Clin Oncol 2014;32:613-614. PUBMED | CROSSREF
71. Symeonidis D, Tepetes K. Techniques and current role of sentinel lymph node (SLN) concept in gastric cancer surgery. Front Surg 2019;5:77. PUBMED | CROSSREF
72. Kamiya S, Takeuchi H, Fukuda K, Kawakubo H, Takahashi N, Mitsumori N, et al. A multicenter non-randomized phase III study of sentinel node navigation surgery for early gastric cancer. Jpn J Clin Oncol 2021;51:305-309. PUBMED | CROSSREF
73. Huang C, Yu F, Zhao G, Xia X. Postoperative quality of life after laparoscopy-assisted pylorus-preserving gastrectomy compared with laparoscopy-assisted distal gastrectomy for early gastric cancer. J Gastroenterol Hepatol 2020;35:1712-1719. PUBMED | CROSSREF
74. Terashima M, Tanabe K, Yoshida M, Kawahira H, Inada T, Okabe H, et al. Postgastrectomy Syndrome Assessment Scale (PGSAS)-45 and changes in body weight are useful tools for evaluation of reconstruction methods following distal gastrectomy. Ann Surg Oncol 2014;21 Suppl 3:S370-S378. PUBMED | CROSSREF
75. Sun Y, Chen C, Hou L, Zhao E. Short-term outcomes and quality of life of esophagogastrostomy versus the double-tract reconstruction after laparoscopic proximal gastrectomy. BMC Cancer 2024;24:1324. PUBMED | CROSSREF

76. Ji X, Jin C, Ji K, Zhang J, Wu X, Jia Z, et al. Double tract reconstruction reduces reflux esophagitis and improves quality of life after radical proximal gastrectomy for patients with upper gastric or esophagogastric adenocarcinoma. Cancer Res Treat 2021;53:784-794. PUBMED | CROSSREF
77. Kim DJ, Kim W. Laparoscopy-assisted proximal gastrectomy with double tract anastomosis is beneficial for vitamin B12 and iron absorption. Anticancer Res 2016;36:4753-4758. PUBMED | CROSSREF
78. Eom BW, Yoon HM, Kim YW, Min JS, An JY, Hur H, et al. Quality of life and nutritional outcomes of stomach-preserving surgery for early gastric cancer: a secondary analysis of the SENORITA randomized clinical trial. JAMA Surg 2024;159:900-908. PUBMED | CROSSREF
79. Eom BW, Park B, Yoon HM, Ryu KW, Kim YW. Laparoscopy-assisted pylorus-preserving gastrectomy for early gastric cancer: a retrospective study of long-term functional outcomes and quality of life. World J Gastroenterol 2019;25:5494-5504. PUBMED | CROSSREF
80. Hosoda K, Yamashita K, Sakuramoto S, Katada N, Moriya H, Mieno H, et al. Postoperative quality of life after laparoscopy-assisted pylorus-preserving gastrectomy compared with laparoscopy-assisted distal gastrectomy: a cross-sectional postal questionnaire survey. Am J Surg 2017;213:763-770. PUBMED | CROSSREF
81. Mine S, Sano T, Tsutsumi K, Murakami Y, Ehara K, Saka M, et al. Large-scale investigation into dumping syndrome after gastrectomy for gastric cancer. J Am Coll Surg 2010;211:628-636. PUBMED | CROSSREF
82. Tanaka C, Kanda M, Misawa K, Mochizuki Y, Watanabe T, Hattori M, et al. The long-term quality of life after distal and pylorus-preserving gastrectomy for stage I gastric cancer: a prospective multi-institutional study (CCOG1601). Surg Today. Forthcoming 2024. PUBMED | CROSSREF
83. Kunisaki C, Yoshida K, Yoshida M, Matsumoto S, Arigami T, Sugiyama Y, et al. Effects of proximal gastrectomy and various clinical factors on postoperative quality of life for upper-third gastric cancer assessed using the Postgastrectomy Syndrome Assessment Scale-45 (PGSAS-45): a PGSAS NEXT study. Ann Surg Oncol 2022;29:3899-3908. PUBMED | CROSSREF
84. Lee SW, Kaji M, Uenosono Y, Kano M, Shimizu H, Noguchi T, et al. The evaluation of the postoperative quality of life in patients undergoing radical gastrectomy for esophagogastric junction cancer using the Postgastrectomy Syndrome Assessment Scale-45: a nationwide multi-institutional study. Surg Today 2022;52:832-843. PUBMED | CROSSREF
85. Youn SI, Son SY, Lee K, Won Y, Min S, Park YS, et al. Quality of life after laparoscopic sentinel node navigation surgery in early gastric cancer: a single-center cohort study. Gastric Cancer 2021;24:744-751. PUBMED | CROSSREF
86. Mocellin S, Pasquali S. Diagnostic accuracy of endoscopic ultrasonography (EUS) for the preoperative locoregional staging of primary gastric cancer. Cochrane Database Syst Rev 2015;2015:CD009944. PUBMED | CROSSREF
87. Fairweather M, Jajoo K, Sainani N, Bertagnolli MM, Wang J. Accuracy of EUS and CT imaging in preoperative gastric cancer staging. J Surg Oncol 2015;111:1016-1020. PUBMED | CROSSREF
88. Jeong SH, Bae K, Ha CY, Lee YJ, Lee OJ, Jung WT, et al. Effectiveness of endoscopic clipping and computed tomography gastroscopy for the preoperative localization of gastric cancer. J Korean Surg Soc 2013;84:80-87. PUBMED | CROSSREF
89. Berlth F, Kim WH, Choi JH, Park SH, Kong SH, Lee HJ, et al. Prognostic impact of frozen section investigation and extent of proximal safety margin in gastric cancer resection. Ann Surg 2020;272:871-878. PUBMED | CROSSREF
90. Saze Z, Kase K, Nakano H, Yamauchi N, Kaneta A, Watanabe Y, et al. Functional benefits of the double flap technique after proximal gastrectomy for gastric cancer. BMC Surg 2021;21:392. PUBMED | CROSSREF
91. Kamiya S, Namikawa T, Takahashi M, Hasegawa Y, Ikeda M, Kinami S, et al. Optimal Procedures for Double Tract Reconstruction After Proximal Gastrectomy Assessed by Postgastrectomy Syndrome Assessment Scale-45. J Gastrointest Surg 2022;26:1817-1829. PUBMED | CROSSREF
92. Han DS, Suh YS, Ahn HS, Kong SH, Lee HJ, Kim WH, et al. Comparison of surgical outcomes of robot-assisted and laparoscopy-assisted pylorus-preserving gastrectomy for gastric cancer: a propensity score matching analysis. Ann Surg Oncol 2015;22:2323-2328. PUBMED | CROSSREF
93. Hu Q, Ohashi M, Ri M, Makuuchi R, Irino T, Hayami M, et al. Safety of robotic double-flap technique following proximal gastrectomy in the introductory phase compared with laparoscopic procedure: a propensity score-matched analysis. Surg Endosc 2024;38:5824-5831. PUBMED | CROSSREF
94. Wang Y, Zhang L, Yang Y, Lu S, Chen H. Progress of Gastric Cancer Surgery in the era of Precision Medicine. Int J Biol Sci 2021;17:1041-1049. PUBMED | CROSSREF
95. Snyder CF, Aaronson NK, Choucair AK, Elliott TE, Greenhalgh J, Halyard MY, et al. Implementing patient-reported outcomes assessment in clinical practice: a review of the options and considerations. Qual Life Res 2012;21:1305-1314. PUBMED | CROSSREF