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Research Article

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Tailoring Gastrectomy for the Aging Stomach: Balancing Risks and Outcomes in Elderly Gastric Cancer Patients

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ABSTRACT

Background: The burden of gastric cancer is shifting toward the elderly, particularly in East Asia where over 60% of cases occur. Despite this, patients aged ≥80 years are often excluded from clinical trials, leaving a gap in surgical guidance for this population.

Objective: To synthesize current evidence and guideline-based recommendations on optimizing gastrectomy in elderly patients (≥80 years), focusing on treatment safety, surgical extent, and the role of minimally invasive techniques.

Methods: A narrative review was conducted using international guidelines (Japanese, Korean, Western) and high-quality studies including meta-analyses and nationwide cohorts. Outcomes assessed included survival, complication rates, and surgical morbidity in elderly patients.

Results: Elderly patients face elevated surgical risk, with increased mortality (RR = 3.23) and complications (RR = 1.36). Endoscopic resection (ER) in very elderly patients (≥85 years) demonstrated favorable 5-year cancer-specific survival (90.7%). When ER is non-curative, additional gastrectomy improved survival (HR = 0.40). Laparoscopic gastrectomy (LG) in octogenarians reduced blood loss and complications while improving survival. Robotic gastrectomy (RG) showed similar benefits, with lower intraoperative blood loss and shorter hospital stay.

Conclusion: Chronological age alone should not preclude curative surgery. In elderly patients, personalized treatment guided by physiologic fitness, frailty, and patient goals enables safe and effective gastrectomy. Minimally invasive strategies such as LG and RG are viable in appropriately selected elderly patients.

Keywords: Gastric Cancer, Elderly Surgery, Octogenarians, Laparoscopic Gastrectomy, Robotic Gastrectomy, Endoscopic Resection, Sentinel Node Navigation Surgery

Introduction

Gastric cancer remains a significant global health issue, ranking fifth in incidence and fourth in mortality worldwide [1]. In East Asia, particularly in Japan, South Korea and China - where 60% of gastric cancer in the world occurs, the proportion of patients aged 80 and older is rising. Yet, clinical trials often exclude this growing subset of patients.

In Korea alone, 33.2% of gastric cancer patients from 1999 and 2019 were aged 70 years and older. The proportion of those 80 years and older also rose from 6.7% to 11.7% during the same period [2]. This pattern is similarly observed in Japan and China and resulted in a growing number of elderly patients being considered for surgical resections.

Surgery is still the standard of care for resectable gastric cancer. But for this subset of patients, the risks and benefits must be carefully weighed despite the improvements in perioperative care.

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A recent metaanalysis by Merga, which included 23 retrospective cohort studies involving 18,372 patients, showed that those who are aged ≥80 years have higher in-hospital mortality (RR: 3.23; 95% CI, 1.46-7.17; P<0.01), and postoperative complications (RR: 1.36; 95% CI, 1.19-1.56; P<0.01) when compared to younger patients [3]. Among these complications, anastomotic leakage is notably higher in the older patients. These findings raise an essential question: Can we safely and effectively tailor gastrectomy for the aging stomach?

This review aims to explore how surgery may be optimized for elderly patients with gastric cancer, and bridge the gap between surgery and oncologic safety by evaluating current evidences on gastrectomy outcomes in patients 80 years and above.

Guideline-Based Personalization of Gastrectomy in Older Adults
Contemporary guidelines advocate for physiological rather than chronological age as the basis for therapeutic decisions and underscore the need for a multidisciplinary team (MDT) decision-making for a personalized approach to gastrectomy in older adults. Therefore, when an elderly patient presents with symptoms of gastric cancer, a comprehensive work-up for tumoral staging should be initiated. Additional evaluations are also warranted to assess the patient's medical condition. The goal is to optimize treatment strategies while balancing oncologic safety and surgical risk.

Endoscopic Resections for Early Gastric Cancer
Endoscopic resection (ER) is the primary treatment option for patients whose tumors are localized to the mucosa (cT1a), provided that they meet the low-risk criteria for lymph node metastasis by the Japanese Gastric Cancer Association as seen in Table 1. This is followed by close follow-up surveillance for early detection of metachronous cancer. This option is strongly recommended for elderly patients as it offers better quality of life (QOL), lower cost, shorter hospital stay and lesser complications.

Table 1: Summary of Japanese Gastric Cancer Association Indications for Endoscopic Resection [4].

Depth of invasion	Ulceration	Differentiated-type		Undifferentiated-type	
Clinically diagnosed T1a	UL (-)	≤ 2 cm	> 2 cm	≤ 2 cm	> 2 cm
		Absolute indication	Expanded indication	Expanded indication	Out of indication
	UL (+)	≤ 3 cm	> 3 cm	Any size	
		Expanded indication	Out of indication	Out of indication	
Clinically diagnosed T1b	UL (-)/(+)	Any size			
		Out of indication			

This is further supported by the study of Kim which is a retrospective nationwide population-based cohort study using data from the Korean National Health Insurance Big Database from 2006 to 2017 [5]. The study revealed that endoscopic resection for EGC significantly improves survival across all age groups, with very elderly patients aged ≥85 years showing 67.8% 5-year OS and 90.7% 5-year CSS (P<0.001), though both were lower than those in younger groups. When compared to age and sex matched controls, mortality risk was significantly reduced in the very elderly (HR = 0.23), elderly (HR = 0.30), and non-elderly (HR = 0.45) groups (P<0.001).

However, when the results of ER do not meet the criteria for curative resections, or when lateral margins remain positive after ER-gastrectomy with lymphadenectomy becomes the standard of care for medically fit elderly patients. This is supported by evidence from a meta-analysis by Li, which included 17 retrospective cohort studies (n=5,880) [6]. It showed that additional gastrectomy after non-curative ESD for early gastric cancer significantly improves 5-year overall survival (OR = 3.63), disease-specific survival (OR = 3.22), and disease-free survival (OR = 4.39). The pooled hazard ratio for overall survival was 0.40, indicating a 60% reduction in mortality risk, with elderly patients also benefiting (HR = 0.54).

But based on the 2024 Korean Guidelines, when surgical morbidity due to additional surgery poses greater risk for elderly patients or those with severe comorbidities, observation with regular follow-up is a valid option after an informed consent was given by the patient.

Gastrectomy for T1b Tumors
For resectable tumors classified as T1bN0, gastrectomy with D1/D1+ lymphadenectomy or modified surgery is weakly recommended by the Japanese guidelines, but is strongly recommended by the Korean Practice Guidelines for Gastric Cancer 2024. This recommendation on the extent of lymphadenectomy for EGC is based on the excellent survival outcomes from the KLASS-01 and JCOG0912 Trials wherein less than D2 dissection was also performed to patients, making it a viable option-especially for elderly and high-risk patients with EGC-to reduce operative stress from an extensive D2 dissection.

To further minimize surgical burden, the Korean Practice Guidelines for Gastric Cancer 2024 conditionally recommends Laparoscopic Sentinel Node Navigation Surgery (LSNNS) as a promising approach for early gastric cancer as long as it is implemented by well-designed protocols and follow-up plans. It involves limited resections- such as function-preserving surgeries - based on intraoperative sentinel node mapping.

The SENORITA trial found that the 5-year outcomes showed no significant difference in DFS (88.9% vs. 80.1%, P=0.0561), overall survival (P=0.7403), or disease-specific survival (P=0.9586) between LSNNS and standard gastrectomy. Gastric cancer–related events were slightly more common in the LSNNS group but were largely curable with additional surgery. These findings suggest that LSNNS is a safe stomach-preserving alternative for selected EGC patients, offering comparable long-term outcomes and improved quality of life when paired with careful surveillance.

LSNNS is a promising, less invasive surgical strategy for elderly patients with EGC, especially when a standard gastrectomy could cause higher risk or reduce postoperative quality of life. However, its cautious application among elderly patients should be guided by thorough assessment and multidisciplinary evaluation.

LSNNS also remains largely investigational outside East Asia, with limited adoption in Western countries due to the need for rigorous protocol adherence, real-time lymphatic mapping and validation through multinational randomized trials. As such, global implementation awaits consensus and technical standardization.

Elderly with Advanced Gastric Cancer

Clinically node-positive (cN+) or T2-T4a tumors warrant a total or distal gastrectomy with a 3-5cm resection margin and a D2 lymphadenectomy. Despite these strong recommendations, the extent of surgery will still depend on the patient's functional status and comorbidity profile. Palliative systemic chemotherapy for unresectable and recurrent diseases is also recommended by current clinical practice guidelines. However, there is no consensus between the Western and Eastern guidelines regarding the benefits of Neoadjuvant Chemotherapy (NCT) for ≥T2 tumors with bulky lymph nodes.

While NCT is favored by Western guidelines; Japan has no consensus about introducing it into clinical practice. On the other hand, the Korean guidelines conditionally recommend its use for resectable locally AGC patients. Initiation of chemotherapeutic agents, whether for palliative, neoadjuvant or adjuvant therapy, should also be tailored on patient's performance status. The Japanese Guidelines strongly recommended chemotherapy for elderly patients provided their general condition and major organ functions are preserved. Otherwise, decisions are made on a case-to-case basis. Moreover, when gastric outlet obstructive symptoms are present in an elderly patient with far AGC, palliative options such as endoscopic stenting or surgical gastrojejunostomy may be considered.

Minimally Invasive Surgery in Elderly Patients

Minimally invasive surgery (MIS) has gained increasing favor in the management of gastric cancer among elderly patients due to its advantages such as reduce operative trauma, quicker recovery and fewer postoperative complications.

Laparoscopic Gastrectomy (LG)

LG has been recognized by Eastern guidelines as non-inferior in terms of perioperative outcomes and oncologic equivalence to open gastrectomy through the pivotal JCOG0912 and KLASS-01 trials. However, they primarily enrolled younger populations, limiting the generalizability of their results to older adults [7,8].

On this note, recent meta-analysis by He demonstrated that LG in patients older than 80 years significantly reduced intraoperative blood loss (WMD = -166.96 mL, P<0.001), shortened hospital stay (WMD = -0.78 days, P<0.001), lower overall complication rates (OR = 0.54, P=0.003), and improved 5-year overall survival (OR= 1.66, P=0.03) and disease-specific survival (OR=3.23, P<0.001) [9]. These findings underscore the safety and efficacy of LG in appropriately selected elderly patients with gastric cancer.

Robotic Gastrectomy (RG)

RG has emerged as a promising alternative to LG as it offers features, such as enhanced dexterity, tremor filtration, and better visualization, which can particularly benefit elderly patients. In a retrospective study by Okumura, RG provided comparable short-term outcomes and disease-specific survival between elderly and younger patients, although overall survival was lower in elderly likely due to non-cancer related mortality [10]. Similarly, Yuksel observed comparable perioperative outcomes and oncologic adequacy in patients aged ≥70 years [11].

A recent retrospective multicenter cohort study by Huang involving 1,393 patients found that RG in elderly resulted in reduced blood loss (89.36 vs 103.39 mL, P=0.046) and shorter hospital stay (9.62 vs 10.47 days, P=0.017) compared to LG with no significant difference in postoperative complications or long-term survival [12]. These findings suggest that RG is a safe and feasible option in fit elderly patients and may offer short-term advantages over conventional LG.

Table: Summary of Key Evidence for Tailoring Gastrectomy in Elderly Gastric Cancer Patients

Intervention/ Strategy	Key Findings	Implication for Elderly
Endoscopic Resection (ER)	In patients ≥85 years, 5-year OS: 67.8%, CSS: 90.7%; HR for mortality: 0.23–0.45 across groups [5].	Preferred for cT1a with low LN risk; better QOL, lower cost and complications
Additional Gastrectomy after Non-curative ER	Significant improvement in OS (OR=3.63), DSS (OR=3.22), DFS (OR=4.39); HR for OS = 0.40 [6].	Strongly recommended if medically fit; improves long-term survival
Laparoscopic Gastrectomy (LG)	Reduced blood loss (WMD = -166.96 mL), shorter stay (WMD = -0.78 days), fewer complications (OR = 0.54), improved 5-year OS (OR = 1.66), DSS (OR = 3.23) [9].	Safe and effective in well-selected elderly; suitable alternative to open surgery
Robotic Gastrectomy (RG)	Lower blood loss and shorter hospital stay vs LG; comparable complications and survival [10-12].	Technically advantageous in elderly; reduced stress, safe in expert hands
Sentinel Node Navigation Surgery (LSNNS)	Non-inferior DFS (5-year), OS, and DSS vs standard gastrectomy; improved QoL with curative salvage for recurrences (SENORITA trial)	Viable for elderly EGC patients needing function-preservation; requires MDT and surveillance

Conclusion

Gastric surgery in patients aged 80 years and older demands an individualized, physiology-driven approach. Comprehensive preoperative evaluation and multidisciplinary planning are critical to risk stratification and optimization. Emerging evidence supports safe application of LG and RG in well-selected elderly patients, offering reduced perioperative morbidity and comparable oncologic outcomes. Ultimately,

tailoring gastrectomy in the elderly is not about doing less-but about maximizing benefit while minimizing harm.

Shared decision-making, informed consent, and respect for individual values must anchor every treatment plan, particularly when navigating trade-offs between oncologic benefit and functional outcomes. By aligning our clinical decisions with patient's goals, we not only extend life but also ensure that it is worth living [13-17].

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