



(RESEARCH ARTICLE)



Gastrectomy: Experience of the general surgery department of Avicenna military hospital, Marrakesh, Morocco

Hicham BABA ^{1,2,*}, Jawad FASSI Fihri ^{1,2}, Ahmed EL KHADER ^{1,2}, Mohamed LAHKIM ^{1,2} and Rachid EL BARNI ^{1,2}

¹ Department of General Surgery, Avicenna Military Hospital, Marrakesh, Morocco.

² Faculty of medicine and pharmacy, Cadi Ayyad university, Marrakesh, Morocco.

International Journal of Science and Research Archive, 2025, 17(03), 572-578

Publication history: Received 08 November 2025; revised on 15 December 2025; accepted on 17 December 2025

Article DOI: <https://doi.org/10.30574/ijrsra.2025.17.3.3240>

Abstract

Background: Gastrectomy remains the cornerstone of curative treatment for gastric cancer and an essential option in bariatric surgery. This study reports the experience of a Moroccan military hospital.

Methods: A retrospective descriptive study was conducted from January 2018 to December 2022 including all patients who underwent gastrectomy for malignant tumors or morbid obesity.

Results: Fifty-one patients were included. Indications were gastric tumors in 45 cases (88.2%) and morbid obesity in 6 cases (11.8%). Mean age was 59.8 years with male predominance (60.8%). Adenocarcinoma represented 84.4% of tumors. Total gastrectomy was performed in 52.3% of cases. Overall morbidity was 29.4% and 30-day mortality was 2%.

Conclusion: Gastrectomy remains a safe and effective procedure with acceptable morbidity in experienced centers.

Keywords: Gastrectomy; Gastric Cancer; Sleeve Gastrectomy; Morocco; Surgical Outcomes

1. Introduction

Gastrectomy is a major surgical procedure involving partial or total resection of the stomach. It is mainly indicated for gastric cancer and, more recently, for morbid obesity as part of bariatric surgery. Gastric cancer remains one of the leading causes of cancer-related mortality worldwide despite a decrease in incidence in some regions. Surgery remains the only potentially curative treatment for localized disease.

In North African countries, including Morocco, gastric cancer is still frequently diagnosed at an advanced stage because of the absence of organized screening programs and the nonspecific nature of early symptoms. The objective of this study was to describe the epidemiological features, indications, surgical techniques, and postoperative outcomes of gastrectomy in a Moroccan military hospital.

2. Materials and methods

This was a retrospective descriptive study conducted at the Department of General Surgery, Avicenna Military Hospital, Marrakesh, from January 2018 to December 2022. All patients who underwent gastrectomy for gastric tumors or morbid obesity were included. Demographic, clinical, radiological, operative, pathological, and postoperative data were collected from medical records. Preoperative assessment included upper gastrointestinal endoscopy with biopsy,

* Corresponding author: Hicham BABA

thoraco-abdomino-pelvic CT scan, and standard biological tests. Statistical analysis was performed using Microsoft Excel. Ethical standards and patient confidentiality were strictly respected.

3. Results

During the study period, 51 patients underwent gastrectomy. The mean age was 59.8 ± 11.6 years (range: 34–82 years), and patients aged 60 years or older represented 54.9% of the cohort. There was a male predominance of 60.8% ($n = 31$), with a sex ratio of 1.55. Six patients (11.8%) were operated on for morbid obesity, with a mean preoperative body mass index of 44.6 ± 3.2 kg/m².

The most frequent presenting symptoms were epigastric pain (78.4%), weight loss (66.7%), vomiting (41.2%), digestive bleeding (23.5%), and dysphagia (11.8%). General condition was altered in 49% of patients at admission. The mean delay between symptom onset and diagnosis was 5.2 ± 2.1 months. Anemia was present in 43.1% of oncologic patients, with a mean hemoglobin level of 9.8 g/dL.

Upper gastrointestinal endoscopy identified a gastric tumor in all oncologic cases and allowed histological confirmation. Tumor location was antral in 46.7%, gastric body in 33.3%, and cardia/fundus in 20.0%. Histological examination showed adenocarcinoma in 84.4%, signet-ring cell carcinoma in 11.1%, and primary gastric lymphoma in 4.5%.

Thoraco-abdomino-pelvic CT scan showed that 68.9% of tumors were locally advanced (T3–T4) at diagnosis. Lymph node involvement was suspected in 57.8% of patients. Two patients (4.4%) had synchronous liver metastases and underwent palliative gastrectomy.

Total gastrectomy was performed in 52.3% ($n = 27$), subtotal distal gastrectomy in 35.9% ($n = 18$), and sleeve gastrectomy in 11.8% ($n = 6$). A D1+ or D2 lymphadenectomy was performed in all oncologic cases. The mean number of lymph nodes harvested was 17 ± 6 . The surgical approach was open in 76.5% and laparoscopic in 23.5%. The mean operative time was 215 ± 38 minutes. Intraoperative blood transfusion was required in 13.7% of patients. No intraoperative mortality occurred.

Postoperative complications occurred in 29.4% ($n = 15$) of patients. According to the Clavien–Dindo classification, 17.6% were Grade I–II, 7.8% Grade III, and 3.9% Grade IV. The main complications were surgical site infection (11.7%), anastomotic leakage (5.8%), pulmonary complications (5.8%), intra-abdominal abscess (3.9%), and postoperative hemorrhage (1.9%). Reoperation was required in 3 patients (5.8%). The mean length of hospital stay was 11.8 ± 4.6 days. One patient died from septic shock secondary to anastomotic leakage, resulting in a 30-day mortality rate of 2%.

Final histopathological staging showed Stage I in 13.3%, Stage II in 31.1%, Stage III in 44.5%, and Stage IV in 11.1%. R0 resection was achieved in 91.1% of curative resections. Lymph node metastases were confirmed in 46.7%, with perineural invasion in 27.5% and lymphovascular invasion in 31.4%. In the bariatric subgroup, the mean excess weight loss at 6 months was $61.3\% \pm 8.4\%$, with significant improvement in metabolic comorbidities.

Table 1 Age and sex distribution

Variable	Value
Mean age (years)	59.8 ± 11.6
Age range (years)	34–82
Patients ≥ 60 years	54.9%
Male sex	60.8%
Sex ratio (M/F)	1.55

Table 2 Presenting symptoms

Symptom	Frequency (%)
Epigastric pain	78.4
Weight loss	66.7
Vomiting	41.2
Digestive bleeding	23.5
Dysphagia	11.8

Table 3 Tumor location

Location	Frequency (%)
Antrum	46.7
Gastric body	33.3
Cardia/Fundus	20.0

Table 4 Surgical procedures

Procedure	Frequency (%)
Total gastrectomy	52.3
Subtotal distal gastrectomy	35.9
Sleeve gastrectomy	11.8

Table 5 Postoperative complications

Complication	Frequency (%)
Surgical site infection	11.7
Anastomotic leakage	5.8
Pulmonary complications	5.8
Intra-abdominal abscess	3.9
Postoperative hemorrhage	1.9

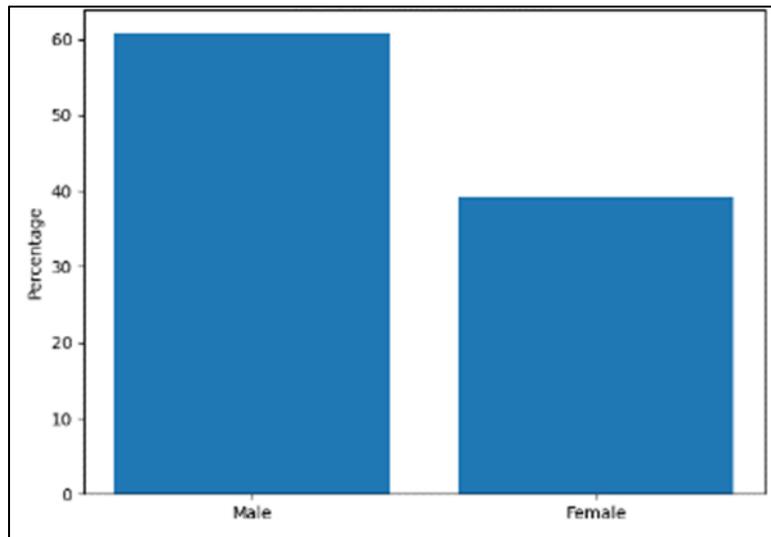


Figure 1 Sex distribution

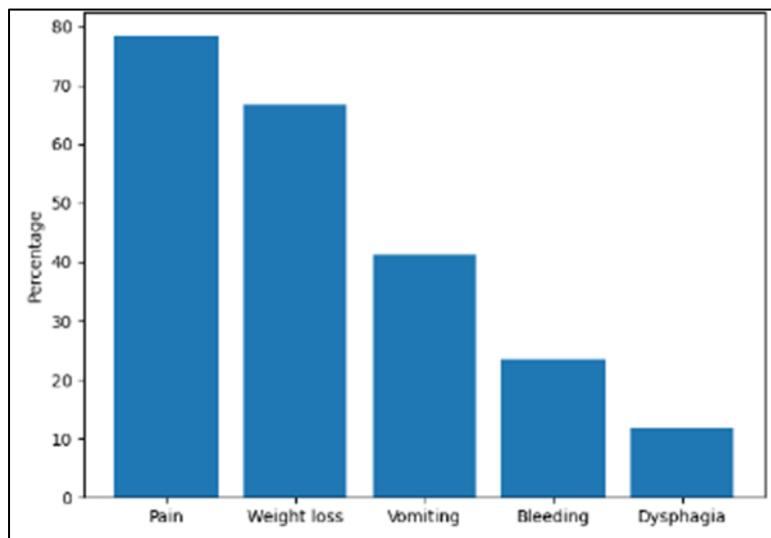


Figure 2 Presenting symptoms

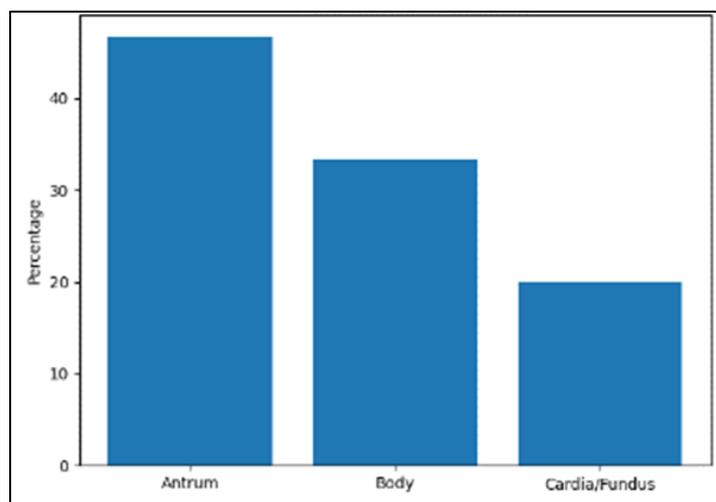


Figure 3 Tumor location

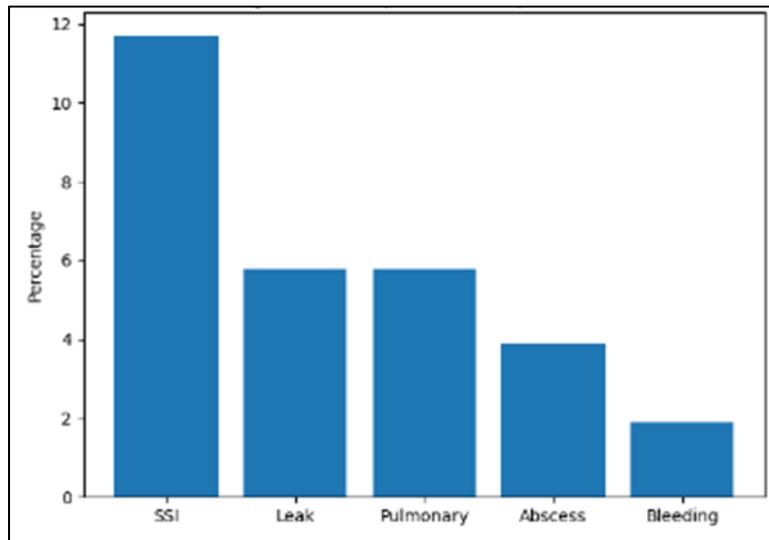


Figure 4 Postoperative complications

4. Discussion

Gastrectomy remains the cornerstone of curative treatment for gastric cancer and a key component of modern bariatric surgery. According to global epidemiological data, gastric cancer remains one of the leading causes of cancer-related mortality worldwide despite a progressive decline in incidence in some regions [1,2]. In North African countries, including Morocco, the disease is still frequently diagnosed at an advanced stage due to the absence of systematic screening programs and the nonspecific nature of early symptoms. In our series, gastric cancer constituted the main indication for gastrectomy, which is consistent with data reported from similar low- and middle-income settings.

The mean age of 59.8 years and the male predominance observed in our study are consistent with international epidemiological profiles [1,2]. The long diagnostic delay of more than five months explains the high proportion of locally advanced tumors (T3-T4). This delay is multifactorial and includes limited access to specialized care, underestimation of early symptoms, and sociocultural barriers.

Upper gastrointestinal endoscopy remains the gold standard for the diagnosis of gastric cancer and allows precise tumor localization and histological confirmation. In our cohort, adenocarcinoma represented more than 84% of cases, in agreement with published series [5]. The presence of signet-ring cell carcinoma in over 11% of patients is clinically relevant because of its aggressive behavior and poor prognosis.

Preoperative staging is essential to determine resectability and therapeutic strategy. Current international guidelines recommend thoraco-abdomino-pelvic CT scan as the standard imaging modality, with endoscopic ultrasound for loco-regional staging whenever available [3,5]. In our setting, staging relied mainly on CT scanning because of limited access to endoscopic ultrasound. The detection of synchronous liver metastases in a minority of cases reflects the late stage at diagnosis.

Total gastrectomy was the most frequently performed procedure in our series. According to international recommendations, total gastrectomy remains mandatory for proximal tumors and advanced infiltrative lesions, while subtotal gastrectomy is oncologically equivalent for distal tumors with adequate margins [5,6]. The high rate of total gastrectomy in our cohort was mainly related to advanced disease and proximal tumor location.

Lymphadenectomy is a pivotal component of oncological gastrectomy. Current standards recommend a minimum harvest of 15 lymph nodes to ensure accurate staging and optimal oncological outcomes [3,5]. The mean lymph node yield of 17 nodes in our series confirms the oncological adequacy of our surgical practice. The high rate of nodal metastases confirms the advanced pathological stage of our patients.

The overall postoperative morbidity rate of 29.4% lies within the range reported in the international literature (20–40%) [9,10]. The most frequent complications were infectious and pulmonary. Anastomotic leakage remains the most

severe complication and was responsible for the single postoperative death. This finding is consistent with large series reporting postoperative mortality rates between 1% and 5% in specialized centers [9,10].

The progressive integration of laparoscopic gastrectomy in our department reflects the global evolution of gastric cancer surgery. Numerous randomized trials and meta-analyses have demonstrated that laparoscopic distal gastrectomy provides oncological outcomes comparable to open surgery, with reduced postoperative pain, earlier recovery, and shorter hospital stay [7,13]. Although still limited in our series, this approach represents a promising perspective for expanding minimally invasive surgery in our institution.

In parallel with oncologic indications, sleeve gastrectomy constituted a significant indication in our study. Bariatric surgery is currently the most effective long-term treatment for severe obesity and its metabolic complications [11]. The excess weight loss observed at 6 months in our bariatric patients and the absence of mortality are consistent with international results supporting the safety and efficacy of sleeve gastrectomy [11,12].

From an oncological standpoint, the predominance of stage III tumors in our cohort explains the anticipated long-term prognosis. Several studies have demonstrated that pathological stage and lymph node involvement are the most powerful predictors of survival after gastrectomy [6,13]. The R0 resection rate of more than 90% in our series is encouraging and reflects acceptable surgical quality despite advanced disease at presentation.

Long-term nutritional consequences after gastrectomy represent a major challenge, particularly after total gastrectomy. Vitamin B12 deficiency, iron-deficiency anemia, protein-calorie malnutrition, and osteoporosis are frequently reported and require lifelong nutritional monitoring and supplementation [14]. These aspects were not systematically assessed in our study and constitute an important limitation.

Other limitations include the retrospective design, limited sample size, single-center nature, and lack of long-term survival and quality-of-life evaluation. Despite these limitations, this study provides valuable real-world data on gastrectomy in a Moroccan military hospital and confirms the feasibility of both oncologic and bariatric gastrectomy in a resource-limited setting.

Overall, our findings confirm that gastrectomy remains a safe and effective surgical procedure when performed in experienced centers with adequate perioperative management. However, the predominance of advanced-stage disease underscores the urgent need for improved early detection strategies, patient education, and optimized referral systems.

5. Conclusion

Gastrectomy remains a safe and effective surgical procedure for both gastric cancer and morbid obesity when performed in specialized centers. Postoperative morbidity is significant but acceptable, and mortality remains low. Early diagnosis, standardized lymphadenectomy, and multidisciplinary management are essential to optimize long-

Compliance with ethical standards

Acknowledgments

The author acknowledges the medical and nursing staff of the General Surgery Department of Avicenna Military Hospital for their contribution to patient care.

Disclosure of conflict of interest

The author declares no conflict of interest.

Statement of ethical approval

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the institutional ethics committee of Avicenna Military Hospital.

Statement of informed consent

Written informed consent was obtained from all patients prior to surgery.

Funding

This research did not receive any specific funding.

Authors' contributions

Hicham BABA: study conception, data collection, surgical management, analysis, manuscript drafting, and final approval.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

References

- [1] Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2020. *CA Cancer J Clin.* 2021;71:209–249.
- [2] Ajani JA, D'Amico TA, Almhanna K, et al. Gastric cancer. *Lancet.* 2017;390(10111):2123–2139.
- [3] Japanese Gastric Cancer Association. Japanese gastric cancer treatment guidelines 2018 (5th edition). *Gastric Cancer.* 2021;24(1):1–21.
- [4] Angrisani L, Santonicola A, Iovino P, et al. Bariatric surgery worldwide 2013. *Obes Surg.* 2018;28(8):2279–2289.
- [5] Smyth EC, Nilsson M, Grabsch HI, van Grieken NC, Lordick F. Gastric cancer. *Lancet.* 2020;396(10251):635–648.
- [6] Siewert JR, Böttcher K, Roder JD, et al. Prognostic relevance of systematic lymph node dissection in gastric carcinoma. *Ann Surg.* 1998;228(4):449–461.
- [7] Kitano S, Iso Y, Moriyama M, Sugimachi K. Laparoscopy-assisted Billroth I gastrectomy. *Surg Endosc.* 1994;8(9):1045–1049.
- [8] International Agency for Research on Cancer. GLOBOCAN 2020: Cancer incidence and mortality worldwide. Lyon: IARC; 2020.
- [9] Dindo D, Demartines N, Clavien PA. Classification of surgical complications. *Ann Surg.* 2004;240(2):205–213.
- [10] Schlottmann F, Patti MG, Herbella FA. Outcomes of gastrectomy for gastric cancer. *J Gastrointest Surg.* 2017;21(1):89–95.
- [11] Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. *JAMA.* 2004;292(14):1724–1737.
- [12] Courcoulas AP, Christian NJ, Belle SH, et al. Weight change and health outcomes after sleeve gastrectomy. *JAMA.* 2013;310(22):2416–2425.
- [13] Strong VE, Wu AW, Selby LV, et al. Differences in gastric cancer survival between the U.S. and Japan. *Ann Surg.* 2015;262(4):698–705.
- [14] Park JY, Kim YJ, Eom BW, et al. Nutritional status after total gastrectomy. *Ann Surg.* 2013;258(6):1044–1051.
- [15] World Health Organization. Obesity and overweight. Geneva: WHO; 2023.