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**Abstract**

**Background:** Although its incidence has decreased over the last 20 years, gastric adenocarcinoma remains frequent (1,033,701 new cases worldwide per year, Globocan 2018). Its prognosis is still poor, with overall survival rates of 10 to 25% despite improvement in surgical and perioperative treatment. In Morocco, we do not have data on survival and predictors of mortality in our population, the present study aims to describe the epidemiological and clinicopathological features of gastric adenocarcinoma and the survival rate.

**Materials and methods:** We retrospectively reviewed data files of 265 patients with histological diagnosis of gastric adenocarcinoma between January 2007 and June 2017. Survival was estimated by the Kaplan Meier method and prognostic factors in multivariate analysis (Cox model).

**Results:** The mean age of our population was 54.48 ± 15.53 with a sex ratio M/F of 1.76. Clinical symptomatology dominated by epigastralgia episodes in two-thirds of the cases and deterioration of the general state in most cases (61.7%). Proximal localization accounted for 17.4%. According to histological classification, poorly differentiated adenocarcinoma was the most common histological type (51.7%). Metastatic or locally advanced tumors accounted for 92% of cases. Only 11% of patients received curative resection. The 5–year survival was 6%. Multivariate analysis revealed three prognostic factors: vascular invasion, advanced stage and differentiation.

**Discussion:** The high mortality of gastric adenocarcinoma in our Moroccan series is probably explained by the late stage at diagnosis. Symptoms are nonspecific and endoscopy is usually performed for advanced symptoms such as anemia, bleeding or weight loss. The main identified prognostic factors in gastric adenocarcinoma are tumor subtype (Linitic forms), stage at diagnosis, vascular and lymph nodes invasion and general performance status which correlates to available data in the literature. Besides, the age distribution of GC in our series showed that the proportion of affected young adult is high (30.6%) compared to data from developed countries varying between 6 and 15%. This age distribution can be explained by the Westernization of diet, the increase of obesity in our population and more exposure to alcohol and tobacco.

**Conclusion:** Overall cancer survival in our population does not exceed 7%, a rate that remains low compared to studies published in the occidental literature. Recommendations have to be elaborated to make a strategy for screening and early diagnosis of gastric adenocarcinoma to improve the survival rate.

**Keywords:** gastric adenocarcinoma, epidemiology, survival

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**Introduction**

Gastric adenocarcinoma is the most common gastric tumor that develops from the gastric epithelium accounting for 90% of all gastric tumors (1). Gastric adenocarcinoma remains the fifth most common cancer and the second leading cause of cancer–related deaths globally (2). Its incidence is high in the eastern countries and low in Africa which has made its epidemiology enigmatic. According to Globocan 2018 data, the higher incidence was received curative resection. The 5–year survival was 6%. Multivariate analysis revealed three prognostic factors: vascular invasion, advanced stage and differentiation.
reported in Eastern Asia – 32.1 case/100000 Ha versus 4.7 case/100000 Ha in North Africa, and rates are 2–fold higher in men than in women (2). Despite its declining incidence due to identification of certain risk factors such as H. pylori and other dietary and environmental risks, it remains the third leading cause of cancer mortality with almost 8.2% of all cancer deaths (783000 death/year) in 2018 (2, 3). Helicobacter pylori is the main risk factor for gastric cancer, with almost 90% of new cases of noncardia gastric cancer attributed to this bacterium. There are also other established risk factors such as food preserved by salting, low fruit intake, alcohol consumption and active tobacco smoking (4, 5). Five years survival data in western countries does not exceed 30% (3, 5).

In Morocco, data are not available on the survival of patients with gastric cancer to date. Therefore, this study aimed to describe the epidemiological characteristics of this cancer in a Moroccan adult population, its prognosis factors and survival.

**Patients and Methods**

**Study population and data source**

We retrospectively analyzed data files of patients with gastric adenocarcinoma admitted at the Department of Gastroenterology of Fez University Hospital, Morocco between January 2007 and June 2017. We also reviewed data from the registry of multidisciplinary consultation meeting in digestive oncology available since 2010. We restricted eligibility to adults (aged 18 years or older) who were diagnosed with histological adenocarcinoma of the stomach. Information on age at diagnosis, sex, risk factors, tumor grade and differentiation, histology primary site, tumor size, treatment type, lymph node involvement, and five years survival were coded and available in the patients’ database.

**Survival analysis**

The primary endpoint in this study was the five years survival that was defined as five years lasing from diagnosis to death. Survival was estimated by the Kaplan Meier method and prognostic factors in multivariate analysis using Cox model.

**Statistical analysis**

All analyses were conducted using P<0.05 as the significance level and statistical analyses were performed with the use of SAS software. Survival analysis was carried out using Kaplan–Meier estimate and prognostic factors were identified by Cox’s regression model.

**Results**

**Patient baseline characteristics**

Two hundred and sixty-five (265) patients were included in this study. Young adults represented 30.6% (n = 81). The median age was 54.48 years (range: 38–80). The sex ratio M/F was 1.76. Smoking was reported in 23.8% (n = 63) of cases. Only four patients (1.5%) reported a family history of gastric cancer and four patients (1.5%) had previous gastrectomy. Almost 42% of patients have been diagnosed 6 months at least after symptom’s onset.

Abdominal pain was the predominant symptom in 60% (n = 159) of patients and upper digestive bleeding (Hematemesis, Melena) in 88 patients (33.2%). Anorexia and slimming were present in almost two-thirds of cases. An epigastric mass was observed in 27% (n = 71) of cases. Upper gastrointestinal endoscopy images showed a process of budding and an ulcerated tumor 60% (n = 159) of cases. Proximal involvement of the tumor was observed in 37.3% of patients (n=99) whereas the distal gastric tumor in antropyloric region was found in only 29% of cases. The tumor was found at a locally advanced or metastatic stage (stage IV) in 92% of patients (n = 244).

Regarding histology analysis, gastric linitis was observed in 41 patients (15.5%). Sixty–five percent (65%) of patients were positive for Helicobacter pylori infection. Only 8.7 % (n=23) of patients had curative surgery +/- perioperative chemotherapy. Almost 40% (104) of patients were in palliative care. Patients, tumor characteristics and treatment options are shown in (Table 1).

**Survival analysis**

The over-all median survival rate shown among patients included in this study was at 11 months with a 95% confidence interval at (10.5 – 11.5) months. Figure 1 below show the Kaplan Mayer survival curve. The five–year survival rate was 7%.

In the univariate analysis using the log–rank test, survival rate was higher among patients with no paraneoplastic syndrome (p<0.04), with no history of gastric surgery (p<0.02), with well differentiated tumors (p<0.01) and for patients treated with surgery (p<0.01).

After adjusting the confounding factors using the Cox model, factors associated with better prognosis were well differentiated histological form, curative surgery treatment and early stage of gastric cancer (Table 2).
Gastric adenocarcinoma (GC) is the fifth most common cancer in the world and is the third cause of cancer death worldwide\(^4\,^5\). This high mortality is probably explained by the late stage at diagnosis, symptoms are nonspecific and endoscopy is usually performed for advanced symptoms such as anemia, bleeding or weight loss. Data from Globocan 2018 has shown that the incidence is probably declining because of the control of the risk factors such as Helicobacter pylori\(^6\,^7\).

According to data from the Cancer Registry of the Greater Casablanca (RCRC) in Morocco\(^8\), gastric cancer is the second most common cancer of the digestive tract in both men and women. The incidence is much lower than in developed countries but the mortality is probably higher than expected\(^9\), unfortunately no data on survival have been published yet.

The age distribution of GC in our series showed that the proportion of affected young adult is high (30.6%) compared to data from developed countries varying.
between 6 and 15%. These differences have to be explained by further studies especially that no high familial predisposition have been noted in our country. In developed and developing countries, men are more affected than women with a sex ratio of 2:1, this was also reported in our study.

Onset of symptoms when dealing with gastric cancer indicates most of the time an advanced disease. Among our patients, almost one third of patients revealed their disease by bleeding complication as reported in other African series, but still higher than reported in developed countries. The ulcer proliferative forms remain the most frequent, 65% macroscopic presentations of the tumors contrasting with reported proportion in the literature around 30% which probably explain the high prevalence of bleeding among patients.

Gastric linitis plastica is a diffuse type of cancer in which the cells invade throughout the stomach, our results are similar to previously published studies concerning the proportion of gastric linitis. Most of the patients have an advanced stage of the disease at the time of diagnosis.

An increased risk of cancer has been associated with the Helicobacter pylori (H. pylori) infection (between 2 and 6-fold compared to the uninfected population). In Africa, the prevalence of H. pylori varies between 70 and 92%. In Morocco, like in most countries with high prevalence of H. pylori infection, we do not have a national program of H. pylori screening, but all patients addressed for esophagogastroduodenoscopy systematically have biopsies to look for H. pylori infection and classify gastritis according to Sydney System and OLGA OLGIM classification before H. pylori treatment eradication. They are treated whenever H. pylori infection is confirmed. This may seem the only available option to reduce the HP attributable risk.

Delay in diagnosis of gastric cancer is a real issue in the management of gastric adenocarcinoma. Symptoms are non-specific and often underestimated by the patient. A study by Hosseini et al have shown that the median delay by general practitioner (from the first referral to endoscopy) was 57 days.

In developed countries, approximately 50 percent have disease that extends beyond the gastric layer at diagnosis. In our series, almost 90% have locally advanced or metastatic disease. Gastric adenocarcinoma has poor prognosis all over the world despite the development of early screening strategies and therapeutic options. It is the third leading cause of cancer death according to Globocan 2018. In our study, the 5-year survival did not exceed 7%, a result that remains much lower comparing with the Western literature data. These survival rates are reported for the first time in a Moroccan population and reflect a dramatic situation of such cancer. This high increased mortality can probably be explained by a delay in diagnosis and treatment of the disease and a high incidence of inoperable forms. The main identified prognostic factors in gastric adenocarcinoma are tumor subtype (Linitic forms), stage at diagnosis, vascular and lymph nodes invasion and general performance status.

We noted that our study has limitations such as: data were analyzed retrospectively, the increased number of lost to follow up patients, and the limited number of patients included in the analysis. Since 2018, we have established a gastric cancer team working and a computerized data base for gastric cancer that will allow a complete record and exhaustive data on gastric cancer and we hope also that the future edition of analysis of regional data of cancers in Morocco will include survival analysis of gastric cancer to confirm our findings.

Conclusion

Gastric adenocarcinoma affects young population in Morocco (30.6%) and has poor prognosis (only 7% 5 years survival). Late diagnosis of gastric cancer in Morocco is probably one of the main reasons, almost 42% of patients have been diagnosed 6 months after symptom’s onset. In the absence of a national screening strategy, efforts must be done to improve early diagnosis such as the acquisition and use of white light high definition endoscopy across the country, screening of high-risk population and facilitating access to health care facilities.

References

Gastric adenocarcinoma in a Moroccan population, N. Lahmidani, et. al.


