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Original Article

Epidemiological characteristics, prognostic factors, and survival of resectable colorectal cancer in a Moroccan population

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Abstract

Introduction: Colorectal cancer is one of the most common digestive cancers worldwide and constitutes a major public health problem in Morocco, a country where its incidence is increasing. The majority of patients are often diagnosed at an advanced stage, which sometimes compromises the prognosis. This study aims to describe the epidemiological, clinical, and histopathological profile of colorectal adenocarcinomas in Morocco and to identify prognostic factors influencing survival.

Materials and Methods: We conducted a prospective, descriptive, and analytical multicenter study between February 2015 and February 2021, including 214 patients with histologically confirmed colorectal adenocarcinoma, followed up in three Moroccan university hospitals (Fez, Oujda, and Rabat). Clinical, pathological, and therapeutic data were collected from medical records. Overall survival was estimated using the Kaplan–Meier method, and prognostic factors were evaluated using multivariate analysis.

Results: The mean age of patients was 57 years (22–86 years), with a sex ratio of 1.02. Colonic forms accounted for 45.8% of cases, mostly located in the left colon, and rectal forms 33.2%, predominantly in the lower rectum. Significant complications were present in 21.5% of cases, primarily obstructions. Histologically, 52.3% of tumors were well differentiated, and 10.3% had a mucinous component. Curative resection was possible in 60.3% of cases. Overall survival was 82% at 1 year, 70.5% at 2 years, and 48.9% at 5 years. Factors associated with a poor prognosis were male gender, age <50 years, advanced tumor stage, the presence of a mucinous component, and the need for palliative treatment.

Discussion: Consistent with global research, our results emphasize the prevalence of late–stage diagnoses and the detrimental effect of tumor complications on survival. Due to delayed presentation and limited early detection, the five–year survival rate is still lower than in Western nations. Poorer outcomes are linked to a mucinous component and a younger age at diagnosis, highlighting the importance of early intervention and focused screening.

Conclusion: Colorectal cancer in Morocco is diagnosed late in nearly one–third of cases, with a major impact

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on survival. Management is based on a multidisciplinary approach integrating surgery, chemotherapy, and radiotherapy. The prognosis is significantly better for early–diagnosed forms undergoing surgery with R0 resection. Strengthening screening and improving access to care are essential to reduce CRC–related mortality in Morocco.

Keywords: Colorectal cancer, Epidemiology, Survival, Prognostic factors, Treatment

Introduction

Colorectal cancer (CRC) is a major public health concern in Morocco and worldwide. It is one of the most common malignant tumors of the digestive tract, with approximately 1.93 million new cases and 935,000 deaths globally in 2020. Globally, colorectal cancer ranks third in terms of incidence and second in terms of mortality [1].

In Morocco, CRC accounts for 6.7% of all recorded cancers between 2008 and 2012, ranking third among all cancers. Its incidence is steadily increasing, as evidenced by cancer registry data from the Greater Casablanca region, where the incidence rose from 5.5 cases per 100,000 inhabitants in 2005–2007 to 8.1 cases per 100,000 inhabitants in 2008–2012 for both sexes combined. It has become the most common digestive cancer, surpassing gastric cancer [2]

Colorectal cancer is a typical example of a malignancy that develops through multiple stages, with a complex carcinogenesis process. The clarification of mechanisms responsible for CRC development and progression, along with the identification of immunohistochemical and molecular markers of aggressiveness, has contributed to improving therapeutic management.

Patients and Methods

This study was a prospective, multicenter, descriptive, and analytical cohort designed to update the epidemiological profile of colorectal adenocarcinoma in three Moroccan university hospitals: Fez, Oujda, and Rabat. It was coordinated by the Gastroenterology Department of Hassan II University Hospital in Fez, in collaboration with the Gastroenterology, Visceral Surgery A and B, and Oncology departments of the same hospital, as well as the Oncology Department of Mohammed VI University Hospital in Oujda and the National Institute of Oncology in Rabat. The study included all patients with a histologically confirmed diagnosis of colorectal adenocarcinoma between February 2015 and February 2021.

Colorectal cancer cases were identified from the records of the Multidisciplinary Consultation Meetings. Clinic–pathological data, including age, sex, tumor anatomical site, pathological stage, therapeutic management, and disease progression, were extracted from the HOSIX hospital information system.

Data analysis was performed using SPSS software version 23. The study included a descriptive analysis covering age, sex, personal and family history, as well as environmental factors, and an analytical analysis incorporating multivariate analysis of prognostic factors and survival assessment using the Kaplan–Meier method. A $p \leq 0.05$ was considered statistically significant.

The inclusion period lasted one year, followed by a total follow–up of five years. Systematic follow–ups were conducted every six months to assess patient survival and detect any disease recurrence.

Materials and Methods

This study was officially approved by the Ethics Committee of the Faculty of Medicine and Pharmacy and the Faculty of Dental Medicine of Fez, as well as by the Ethics Committee of Hassan II University Hospital of Fez, under reference number 12/14. Prior to participation in the study, informed consent was obtained from each patient, initially orally and subsequently through written consent signed on an appropriate form.

Results

Descriptive Study

Our study included 214 patients, with a mean age of 57.1 ± 13.7 years (range 22–86). More than half of the participants (54.2%) were between 50 and 75 years old. The cohort comprised 108 women (50.5%) and 106 men (49.5%), resulting in an almost equal male–to–female ratio of 1.02. Regarding personal medical history, one patient (0.46%) had polyps, 33 (15.4%) had diabetes, 27 (12.6%) had hypertension, 12 (5.6%) had heart disease, and one (0.5%) had a pulmonary condition, while none had inflammatory colitis or other cancers. Regarding family history, 14 patients (6.5%) had a family history of colorectal cancer, but none had a history of polyps or inflammatory colitis. Among other familial cancers, 17 patients (7.9%) had a history of lung cancer, one patient (0.46%) had a history of gastric cancer, three patients (1.4%) had a history of breast cancer, and three patients (1.4%) had a history of unspecified cancers.

Abdominal pain was the most frequent symptom leading to CRC diagnosis, present in 40.7% of cases. Complications

		Number of patients. (N=)	Percentage
The average age		57.08 ± 13.7 years	
Sex	women	108	50.5%
	Men	106	49.5%
Personal history	**Polyps**	1	0.46%
	Inflammatory colitis	0	0%
	Other cancers	0	0%
	Diabetes	33	15.4%
	HTA	27	12.6%
	Heart disease	12	5.6%
	Pulmonary pathology	1	0.5%
Family history	**CCR**	14	6.5%
	Polyps	0	0%
	Inflammatory colitis	0	0%
	Other cancers:	**17**	**7.9%**
	Lung	1	0.46%
	Stomach	3	1.4%
	Breast	3	1.4%
	Not specified	10	4.6%

Table 1: Epidemiological characteristics of 214 Moroccan patients with colorectal cancer.

were the initial mode of diagnosis in 21.5% of cases, with 84.8% involving obstruction, 6.5% perforation, and 4.3% abscesses and fistulas. The patients' general condition was assessed using the WHO performance status scale, revealing that 65.3% of patients were in relatively good condition (WHO 0–1), whereas 34.7% had a deteriorated general state, typically at a metastatic stage (WHO 2–4). Digital rectal examination detected the tumor in 29.44% of patients, mainly localized in the lower rectum. Metastatic hepatomegaly was diagnosed in 14.5% of patients, while peripheral lymphadenopathy was found in 3.27% of cases.

Colon cancer was the most frequent CRC localization, observed in 45.8% of patients (n=98) diagnosed through colonoscopy. Rectal cancer followed, occurring in 33.2% of cases (n=71), while rectosigmoid junction tumors accounted for 21% (n=45). Regarding colonic tumor localization, most cases (70.4%, or 69/98) were found in the left colon. Right–sided tumors were less common, representing 27.5% of cases (27/98), while only 2 patients (2.04%, 2/98) had tumors in the transverse colon. Among rectal cancers, the lower rectum was the most frequently affected site, accounting for 88.7% of rectal cases (63/71). Mid–rectal cancer was identified in 5.6% of cases (4/71), and a similar incidence in the upper rectum. Finally, two patients (0.93%) had dual tumor locations: one in the left colon and rectosigmoid junction, and the other in the rectum and rectosigmoid junction.

This study focused on colorectal adenocarcinomas. Among the 214 CRC cases analyzed, histological confirmation was obtained through biopsies or surgical specimens. Regarding tumor differentiation, 52.3% were well–differentiated, 41.1% were moderately differentiated, and 6.6% were poorly differentiated. Tumor invasion into adjacent structures was observed in 21.5% of cases, while vascular emboli were detected in 17% of cases. Perineural invasion was identified in 11.2%, and a mucinous component was present in 10.3% of samples.

Settings	N (%)
Degree of differentiation: Well differentiated Moderately differentiated Poorly differentiated	 112 (52.3 %) 88 (41.1%) 14 (6.6 %)
Mucous colloid component	22 (10.3%)
Vascular emboli	37 (17.3%)
Perineural sheathing	24 (11.2 %)
Invasion Level **Mucosa** **Submucosa** **Muscular** **Subserous** **Serous** **Adjacent Structures**	 3 (2.3%) 6 (4.5%) 19 (14.4%) 67 (50.8%) 19 (14.4%) 18 (13.6%)
Curative resection:	129 (60.3 %)
Proximal surgical limit: **–Healthy** **–Tumor involvement** Distal surgical limit: **–Healthy** **–Tumor involvement**	 128(59.8%) 2(0.9 %) 125 (58.4 %) 3(1.4%)
MSIlMSS Status: **MSI** **MSS**	5(6.1 %) 2(2.44) 3(3.66)

Table 2: Histological characteristics of colorectal adenocarcinomas:

Immunohistochemical analysis was performed on 82 colorectal cancer (CRC) cases, with a probable microsatellite instability (MSI) or microsatellite stability (MSS) status found in five patients (6.1%). Two patients exhibited microsatellite instability (MSI) without any personal or family history of cancer or Lynch syndrome–related tumors. One of these tumors was located in the right colon, while the other was in the sigmoid colon. Three patients had microsatellite stability (MSS). Among them, two had left–sided colonic cancer with two unspecified familial neoplasms (in uncles), while the third had sigmoid colon cancer. The MSS group comprised two men and one woman, while the MSI group included one man and one woman.

The records of potentially resectable patients were presented at the multidisciplinary team meeting (MDT), and the decision regarding resection was made during the meeting. Surgical resection was performed on 203 patients (94.9% of cases) diagnosed with colon or rectal cancer. Among the various specimens examined, curative resection was achieved in 129 patients (60.3%), whereas 74 cases (34.6%) did not meet curative criteria.

Among the patients treated, 38 underwent an anterior rectal resection (ARR) with colorectal anastomosis, while 8 underwent a proctectomy followed by a coloanal anastomosis. Three patients were treated with anterior rectal resection combined with hysterectomy, left adnexectomy, and pulmonary metastasectomy. Fourteen patients received abdominoperineal amputation (APA) with a permanent left iliac colostomy. Additionally, 19 patients underwent colectomy, 27 underwent left hemicolectomy, 32 underwent right hemicolectomy, and 29 underwent segmental sigmoid resection (SSR). Surgical biopsies were performed in 21 patients, though details regarding their subsequent management were not specified. Finally, 12 patients underwent hemicolectomy with metastasectomy.

Neoadjuvant therapy was prescribed for 27.6% of patients, accounting for 59 cases. Among them, 17 patients (28.8%) received preoperative chemotherapy, including eight cases with colonic tumors and nine with rectal tumors. Radiotherapy alone was administered to one patient with rectal cancer, representing 1.7% of cases. Chemoradiotherapy was indicated in 41 patients (69.5%), in the absence of contraindications and significant non–hematological side effects. Among these 41 patients, only one had a colonic tumor, while the remaining 40 had rectal involvement.

In our study, 27.2% of patients (55 cases) received palliative treatment. These were either patients in whom unresectable tumor metastases were discovered during surgery, patients who experienced disease progression before surgery, or patients

Analytical Study

We conducted a comparative study of the epidemiological, clinical, and histological characteristics of colon and rectal cancer. Patients under 50 years of age accounted for 33.6% of cases. A slight female predominance was observed in rectal cancers, suggesting a tendency for rectal lesions to be more common in women. No statistically significant difference was found between colon and rectal cancer regarding a family history of colorectal cancer, the presence of a mucinous colloid component, the occurrence of metastatic disease at diagnosis, or the degree of tumor differentiation. From an epidemiological and clinical perspective, these two cancer locations share similarities. However, complicated forms were more frequent in colonic cancers, with a rate of 65.9% compared to 34.1% for rectal cancers. Conversely, a higher prevalence of metastatic forms was

Type of Surgery	Effective	Frequency%
Anterior resection of the rectum (RAR)+ colorectal anastomosis	38	18.7
Proctectomy + colo–anal anastomosis	8	3.9
RAR+hysterectomy+annexectomy left + pulmonary metastasectomy	3	1.5
An abdominoperineal amputation	14	6.9
Right hemicolectomy	32	15.7
Left hemicolectomy	27	13.3
Colectomy	19	9.3
Segmental resection of the sigmoid colon	29	14.2
Surgical biopsy	21	10.34
Hemicolectomy with resection of liver metastases	12	6

Table 3: The different types of colorectal cancer surgery:

observed in rectal cancer, accounting for 54.4% of cases, compared to 45.6% for colon cancer.

The overall survival in our series was assessed using the Kaplan–Meier method, considering the date of diagnosis and either the date of death or the last follow–up visit. At the end of the follow–up period, 174 patients, representing 81.7% of the study population, were still alive, while 40 patients (18.7%) had died. The overall survival rate across all stages was estimated at 92.2% at six months, 82% at one year, 70.5% at two years, and 48.9% at five years. Figure 1 illustrates the Kaplan–Meier curve for overall survival of patients with colorectal cancer in our series, showing a progressive decline in cumulative survival over the follow–up period.

Analysis by gender revealed a one–year survival rate of 74.3% in men compared to 89.1% in women. At two years, survival reached 70.4% and 70.7%, respectively, while at five years, it was 43.5% for men and 56.2% for women.

Regarding age, patients under 50 years old, who accounted for 33.6% of the sample, had a one–year survival rate of 82.1%, compared to 82.3% in older patients. At two years, these rates were 63.2% and 75.8%, respectively, and at five years, 45.1% and 52.2%.

Colorectal cancer progression to a complicated stage was observed in 21% of patients. Their one–year survival rate was 89.5%, compared to 78.6% in those diagnosed without complications. At five years, these rates were 64.4% and 49.8%, respectively.

Tumor location also influenced survival rates. One–year survival was 82.1% for colonic tumors, 86.8% for rectal tumors, and 72.2% for tumors located at the rectosigmoid junction. At three years, these rates were 60%, 53%, and 32%, respectively.

Disease progression based on the stage at diagnosis also had an impact on survival. One–year survival was 93% for localized cancers, 87.7% for locoregional forms, and 58.7% for metastatic cancers. At five years, survival rates were 58.4% for localized forms, 70.1% for

Settings	Colon cancer (n=98)	Rectal cancer (n= 116)	P
Age (years) **–50** **+50**	 30 (41.7%) 68 (47.9%)	 42 (58.3%) 74 (52.1%)	0.39
Sex Ratio F/M	0.9	1.07	0.69
Family history	5 (35.7%)	9 (64.3%)	0.43
Tumor complications	29 (65.9%)	15 (34.1%)	0.003
Disease status **Located** **Local regional** **Metastatic**	 39 (38.6%) 13 (48.1%) 31 (45.6%)	 62 (61.4%) 14 (51.9%) 37 (54.4%)	0.54
Curative resection	62(48.1%)	67 (51.9%)	0.50
Mucous colloid component	12 (54.5%)	10 (45.5%)	0.36
Poorly differentiated adenocarcinoma	7 (53.8%)	6 (46.2%)	0.75
Vascular embolus	21 (56.8%)	16 (43.2%)	0.18

Table 4: Comparison of clinical and histological characteristics of colon and rectal cancer.

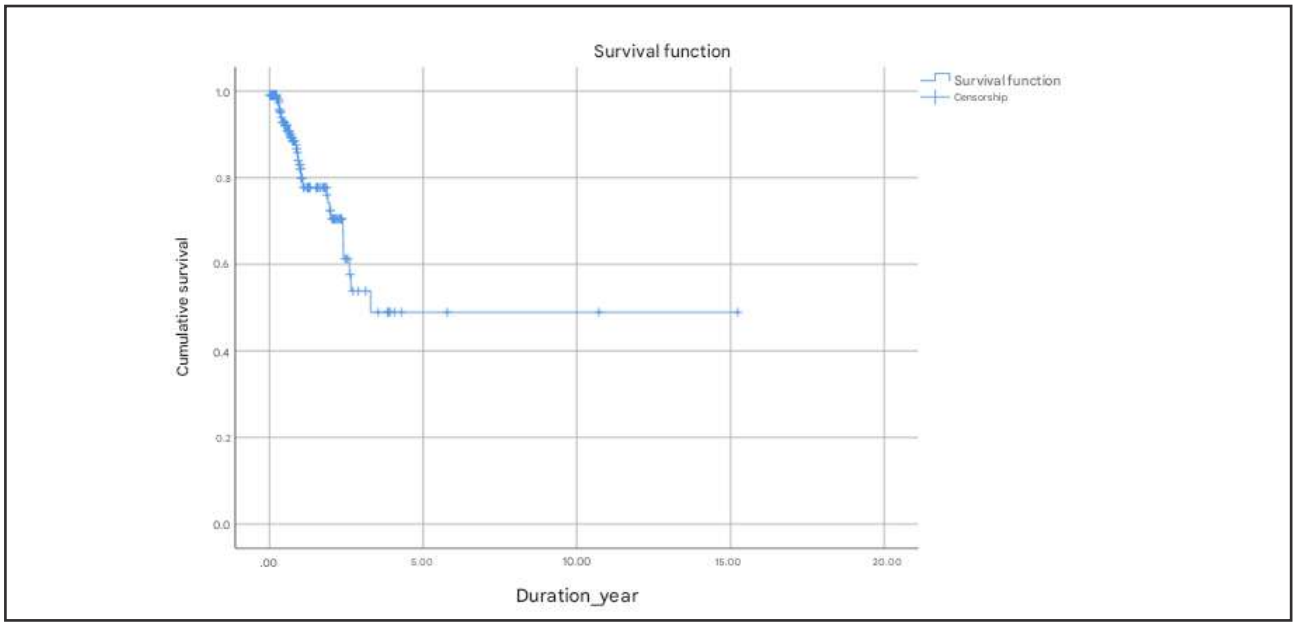


Figure 1. Kaplan–Meier survival curves for overall survival among 214 patients with colorectal cancer.

locoregional forms, and 50.2% for metastatic cancers.

Regarding treatment, patients who received palliative care had a one–year survival rate of 56.7% and a five–year survival rate of 39.9%, compared to 92.3% and 58% for those who received other therapeutic options. Furthermore, patients who underwent curative resection (R0) had a survival rate of 96.3% at one year and 57% at five years, whereas those with non–curative resection had rates of 60.5% and 54.8%.

Tumor extension to adjacent structures was observed in 28 cases in our series. Survival in this group was 82.5% at one year and 33% at two years. For the other group of patients without tumor extension to surrounding structures, survival was 92.8% at one year, 83.6% at two years, and 56.8% at five years.

The degree of tumor differentiation was also a determining factor. Patients with well–differentiated adenocarcinoma had a survival rate of 83.3% at one year and 62.2% at five years, compared to 82.2% and 16.8% for moderately differentiated forms. Poorly differentiated adenocarcinomas, found in 13 patients, had a one–year survival rate of 65.9%.

Finally, the presence of an associated mucinous colloid component negatively influenced survival, with rates of 82.5% at one year and 29.5% at two years, compared to 85.3% and 60.9% in other patients.

In conclusion, several factors influenced the survival of colorectal cancer patients in our series, including male sex, tumor location, disease stage at diagnosis, tumor differentiation, and the presence of a mucinous colloid component.

The summarized survival analysis results are presented in the following table.

The analysis of colorectal adenocarcinomas in our study highlighted several prognostic factors influencing patient survival. Regarding patient–related factors, an age below 50 years appears to be associated with a poorer prognosis compared to older patients. Similarly, male sex constitutes a negative prognostic factor in our series. Moreover, the presence of acute complications such as intestinal obstruction or perforation at the time of diagnosis was correlated with a more severe disease progression.

Concerning tumor–related factors, the disease stage at diagnosis is crucial. An early diagnosis offers better chances of recovery, whereas advanced disease significantly reduces survival rates. The analysis of surgical margins after colorectal tumor resection shows that the prognosis is better when these margins are free of cancer cells, unlike cases where they are infiltrated.

The presence of a mucinous component in the tumor is also associated with increased aggressiveness and a poorer prognosis. Additionally, the degree of tumor cell differentiation significantly influences survival: the one–year survival rate is 83.3% for well–differentiated tumors but drops to 65.9% for poorly differentiated forms, highlighting the severity of high–grade cancers compared to low–grade ones.

Finally, the type of treatment received plays a crucial role in disease progression. The one–year survival rate was 92.3% for patients who do not require palliative treatment, whereas it drops to 56.7% for those receiving palliative

	Survival (years)				
Factors	**1 year**	**2 years**	**5 years**	**Average**	**P**
Overall survival	82%	70.5%	48.9%	8,323	–
Gender:					
Man	74.3 %	70.4 %	43.5 %	7,587	0.17
Women	89.1 %	70.7%	56.2%	3,971	
Age:					
<50 years old	82.1 %	63.2 %	45.1 %	3,481	0.58
>50 years old	82.3 %	75.8%	52.2%	8,804	
Diagnostic circumstances:					
Complication (+)	89.5 %	80.5 %	64.4 %	4,395	
Complication (–)	78.6%	67.4%	49.8 %	8,326	0.14
Seat:					
Colon	82.1 %	76.3 %	60 %	2,852	
Rectum	86.8 %	68.7%	53%	6,445	0.48
Rectosigmoid junction.	72.2 %	64.1%	32 %	6,194	
Diagnostic stage:					
Located	93 %	82.2%	58.4 %	9,719	
Locoregional	87.7 %	–	70.1 %	4,438	<0.001
Metastatic	58.7 %	–	50.2 %	2,296	
Curative resection:					
Yes	96.3 %	81.7 %	57 %	9,590	<0.001
No	60.5 %	–	54.8 %	2,447	
Locoregional extension:					
Yes	82.5 %	33 %	–	1,794	0.008
No	92.8%	83.6 %	56.8 %	6,937	
Degree of differentiation:					
Well, differentiated	83.3 %	73.5%	62.2 %	7,178	
Moderately differentiated	82.2 %	65.3%	16.8 %	2,735	0.52
Poorly differentiated	65.9 %	–	–	2,840	
Mucous colloid component:					
Yes	82.5 %	29.5%	–	2,040	0.07
No	85.3 %	78.2%	60.9 %	7,156	

Table5 : Prognostic factors and CCR

care, emphasizing the impact of therapeutic management on the prognosis of colorectal cancer patients.

Discussion

The incidence and mortality rates vary significantly from one country to another. Indeed, the highest incidence is recorded in Europe, Australia, and New Zealand, while the highest mortality rate is observed in Eastern Europe[3]. According to Moroccan statistics from Globocan 2020, colorectal cancer ranks third in terms of frequency after breast cancer in women and prostate cancer in men. Thus, in Morocco as elsewhere, both in the East and the West, colorectal cancer has become a real public health problem, regardless of the ethnic differences

characterizing each country and/or region.

In our series of 214 patients with colorectal cancer, the average age of the patients was estimated at 57.08 ± 13.7 years. This result is comparable to the average age of 53.5 years reported in the Rabat cancer registry and the 54 years recorded in 2014 by El Housse et al. [4] Similar average ages have been reported by an Egyptian study reaching 57.6 years [5].

Gender distribution differences in colorectal cancer have been extensively studied. The literature reports a more pronounced male predominance in rectal cancers than in colonic cancers, with a sex ratio ranging between 1.5 and 1.6 for the rectum and between 0.8 and 1.4 for the colon [6].

Clinically, European studies show that more than 70% of patients seek medical consultation within six months, whereas Moroccan studies have indicate that over 60% of patients consult late, beyond six months [4]. This diagnostic delay in our context is due to the reluctance to seek medical help, embarrassment regarding symptoms, or frequent neglect of initial symptoms. The delay before consultation has been considered a prognostic factor; the shorter the delay, the longer the survival.

Abdominal pain was the most frequently reported symptom in our series. It was present in 40.7% of cases in our series, 32% in Keli's series, and 70% in Chraibi's series [7][8] Colorectal cancer was the most common cause of colonic obstruction. Discovering colon cancer during an obstruction carries a poor prognostic value [9], as these cancers are often locally advanced. At the same local stage, survival is lower in patients operated on for obstruction, and post–operative complications (morbidity and mortality) are more frequent after surgery for obstruction [10,11]. While rectal cancers rarely cause obstruction (<5% of cases), prospective studies by Biondo et al. and others report occlusive and perforation complication rates ranging from 10 to 40% in colon cancer cases [12,13]. Perforation, a rare complication of colonic cancer, is feared by practitioners due to its very poor prognosis. The characteristics of perforation vary depending on its location, whether within or near the cancerous site [14]. Rectal bleeding is found in 70% of cases in the literature. It was reported in 59% by Keli et al., and in 86.5% in Boutaalla et al.'s series [7] [15]

In our series, colon cancer was located in the left colon in 69 cases, in the right colon in 27 cases, and in the transverse colon in two cases. About 63 out of the 71 cases of rectal cancer had a tumor in the lower rectum, representing 88.7%. Overall, our results align with those in the literature, which report a more pronounced predominance of left–sided colon cancer, particularly in studies by M. Adloff, Konaté, [16,17]. Hamed–Abdelouahab et al. noted the presence of lower rectal cancer in 55.7% of rectal cancer cases [18]. In Keli's series, the tumor was palpable in 41% of cases, and 52.3% of rectal tumors were located in the lower rectum [7].

Histologically, more than half of the adenocarcinomas in our series were well–differentiated, compared to 90% in A rfaoui's series [19]. Overall, the well–differentiated form of colorectal cancer is the most common in most series [17, 20, 21]. In our sample of 214 patients, perineural invasion was present in only 24 patients representing 11.2%, versus 58% in Arfaoui's series. Vascular invasion was found in 17.3% of cases in our series, compared to 40% in Arfaoui et al.'s series [19]. Mucinous colloid adenocarcinoma was present in only 10.3% of cases in our series, 4.2% in Konaté's series, and 22.4% in Arfaoui Touimi's series.

The treatment of colorectal cancer is primarily based on surgery, which remains the standard therapeutic option when curative resection is feasible. Operability in our series was 94.8% (n=203). Curative resection was performed in 129 patients (60.3%), while 74 cases (34.6%) did not undergo curative surgery. In his series of 71 patients with colorectal cancer treated at Hassan II University of Dakar between 2000 and 2008, Konaté reported an operability rate comparable to ours (93% of colorectal cancer cases operated on in Dakar) [17].

In general, the goal of curative surgery for colonic cancer is the complete resection of the tumor with lymph node dissection. Surgical treatment is the primary approach for colonic cancer. However, the disappointing results of exclusive surgery in advanced cases have led to the addition of adjuvant chemotherapy [22] ; Operability in our series was 94.8% (n=203), with curative resection performed in 129 patients (60.3%) and 74 cases (34.6%). In his series of 71 patients with colorectal cancer treated at CHU Dakar between 2000 and 2008, Konaté reported an operability rate similar to ours (93%) [17].

In our series, 62 patients with colonic cancer underwent curative resection. Additionally, local chemotherapy was indicated for eight patients, while only one patient received chemoradiotherapy for rectal cancer. A total of 28 patients received palliative treatment. In Europe, resectability rates vary by country and hospital series. Overall, the resectability rate for colon cancer is 68.4% in England and 81.3% in Sweden, but significantly lower in Norway and Denmark. To explain the lower resectability rates in other European countries, studies by Majano et al. suggest that sociodemographic and clinical characteristics play a role. Indeed, surgical attitudes appear to differ based on patient age in these countries. Although the data from this study do not include comorbidity factors,

the risk of increased perioperative mortality should not be underestimated. Another difference between these countries is the early introduction of systematic screening in England in 2006. In contrast, Norway and Denmark did not have a colorectal cancer screening strategy even by 2010–2012 [23]

In our series, 67 out of 71 patients with rectal cancer underwent curative resection, yielding a resectability rate of 94.36%. This is a high rate compared to reports from both African and European literature. Indeed, Konaté's Senegalese series reported a resectability rate of only 66.7%. Furthermore, a meta–analysis of multiple studies cited in the Netherlands Cancer Registry reported variable resectability rates ranging from 68% to 89% across different hospitals [24]. In England and Sweden, the resectability rates for rectal cancer are 59.9% and 70.8%, respectively [23].

While surgical resection remains the only curative therapeutic option in colorectal cancer, other conservative strategies, including post–neoadjuvant chemotherapy surveillance after successful treatment, are gaining recognition in the literature [25]. This second strategy, reserved for a precise selection of patients, allows for excellent rectal preservation and pelvic tumor control. However, it leads to lower survival rates and a higher incidence of distant progression [25].

The prognosis of colorectal cancer has improved over the past 20 years. This improvement has primarily been observed in European countries, but in our Moroccan context, the prognosis remains poor. This is due to several factors, including late diagnosis of the cancer, the aggressiveness of histological forms, and the high rate of low rectal localizations. In our series of 214 patients with CRC, the factors associated with poor prognosis include age under 50, male sex, and the presence of complications at the time of diagnosis. In the literature, age is a very controversial prognostic factor. Some studies have concluded differently from ours, suggesting that the occurrence of colorectal cancer in older individuals is a poor prognostic factor. The poor prognosis in elderly patients may be explained by the typically late discovery of the disease, comorbidities, and the reluctance to administer adjuvant treatment, particularly chemotherapy, to elderly patients. There is no significant difference in survival based on patient age. In our sample, tumor–related factors associated with poor prognosis include tumor stage, local tumor extension, and the administration of palliative treatment. Our findings are consistent with those of other studies. However, while our study did not identify other prognostic factors, Roshani's research has demonstrated that poor prognosis in CRC is also associated with mucinous histological type compared to adenocarcinoma, and that well tumor differentiation and operability, as well as the use of combination therapies, are associated with a much better prognosis [26].

The 5–year overall survival after resection of CRC varies according to different studies. Overall, the survival rate is similar to that found in several studies; in contrast, other studies conducted in South African and/or less developed regions have recorded very low survival rates, reflecting a lower survival rate in these areas [27]. In our series of 214 patients with CRC, the overall survival across all stages is 92.2% at 6 months, 82% at 1 year, 70.5% at 2 years, and 48.9% at 5 years. Thirty–seven patients have died, which corresponds to an overall mortality rate of 17.28%. This table allows for the comparison of the overall survival of colorectal cancer reported in different studies.

Survival by sex shows a slight difference in favor of women. In our sample of 214 colorectal cancer patients, the survival rate was 89.1% for women compared to 74.3% for men at one year, 70.7% versus 70.4% at two years, and 56.2% versus 43.5% at five years. In the literature, the variability of mortality rates by sex is more pronounced on a global scale. Colorectal cancer mortality is estimated to be six times higher in men and four times

Series	Period of study	Country	Bad factors prognosis		Good prognostic factors
			Patient Related	Tumor – related	Tumor – related
Wismayer et al[27]	2008–2018	Uganda	–	Tumor stages II, III and IV	Combination therapeutic
Roshani et al[26]	2009–2014	Kurdistan	Age > 50 years, low socio–economic level, lack of health coverage, smoking	Histological type mucinous	Well–differentiated tumor, operable, therapeutic combination
Our series	**2015–2021**	**Morocco**	**Male gender, presence of complications at the time of diagnosis**	**Tumor stage, extension to the surrounding area, palliative treatment**	**R0 resection**

Table 6: Prognostic factors for the development of CRC (comparison between several studies)

higher in women. The highest mortality rates are observed in Central and Eastern Europe, reaching 20.3 per 100,000 in men and 11.7 per 100,000 in women. In contrast, the lowest rates are recorded in West Africa, with 3.5 per 100,000 in men and 3.0 per 100,000 in women [27].

Survival by age shows significant disparities in our study. Patients diagnosed with colorectal cancer before the age of 50 represent 33.6% of our population. Their survival rate is 82.1% at one year and 45.1% at five years. This rate is lower than that of patients diagnosed after the age of 50, who have a survival rate of 52.2% at five years. At the European level, the five–year survival rate for colorectal cancer improved between 1992 and 2004 for all age groups. In France, this improvement led to an increase in the survival rate from 57% to 62% for patients over 70 years old and from 51% to 52% for those over 80 years old with colon cancer. For rectal cancer, these rates increased from 55% to 60% and from 46% to 48% in the same age groups [28].

Survival by disease stage also shows a notable difference. Our study of 214 colorectal cancer patients highlights a marked difference between patients treated at the localized stage and those treated at the metastatic stage: one–year survival rates were 93% versus 58.7%, and five–year survival rates were 58.4% versus 50.2%. A study by Benbekhti also showed a progressive decrease in survival probability depending on the initial stage of the disease. At five years, survival was 84.2% for patients diagnosed at the localized stage, 66.7% for those with locoregional involvement, and only 30% for patients with metastases. This difference was statistically significant, with a median survival of 23 months for all colorectal cancer patients at the time of diagnosis, These results are corroborated by other larger studies [29].

Survival by treatment type is also influenced by the therapeutic approach. Whether for colon cancer patients or rectal cancer patients, our study shows a notable difference based on the treatment received. Overall survival is significantly higher for patients who underwent curative resection compared to those who received palliative treatment: 96.3% versus 56.7% at one year, 81.7% versus 53.1% at two years, and 57% versus 39.9% at five years. A retrospective study by Roshani reached the same conclusions, with even more marked improvement when surgery was combined with chemotherapy treatment [26].

Conclusion

Colorectal cancer is a major public health issue in Morocco and worldwide, ranking as the third most common cancer and the second leading cause of cancer–related mortality. In our population, it predominantly affects patients over the age of 50, with a slight female predominance for rectal cancer. The diagnosis is often made at a late stage in one–third of cases, with the disease mainly presenting as abdominal pain or rectal bleeding. Colonoscopy remains the reference examination for exploring the colon and rectum, allowing for biopsy collection, while the pathological analysis confirms the diagnosis.

The management of colorectal cancer relies on a multidisciplinary approach involving surgeons, pathologists, radiologists, and oncologists to tailor treatment to the specific characteristics of each tumor and the patient's profile. Surgery is the cornerstone of treatment, while radiotherapy and chemotherapy play a critical role in adjuvant therapy. The prognosis is more favorable when the disease is diagnosed early, highlighting the importance of screening in at–risk populations.

This study highlights the need to intensify efforts to raise awareness of colorectal cancer risk factors, improve accessibility to diagnosis through the development of more sensitive methods, and promote widespread screening. It also emphasizes the importance of educational campaigns for prevention, strengthening access to care, and encouraging cancer research. Finally, the establishment of a national colorectal cancer registry incorporating data from both public and private sectors would optimize epidemiological surveillance and improve patient care. These coordinated actions would significantly reduce morbidity and mortality related to this disease in Morocco.

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Conflict of Interest

The authors declare that they have no conflicts of interest related to this work.

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