Original Paper

Colorectal Cancer in County Durham-England a Clinical and Statistical Study

DANIEL SORIN ILIE[1], MIRCEA-SEBASTIAN ŞERBANESCU[2], NINA IONOVICI[3], CRISTINA JANA BUSUIOC[4], LAURENȚIU MOGOANTĂ[4]

[1]PhD Student, Doctoral School, Department of Histology, University of Medicine and Pharmacy of Craiova, Romania

[2]Department of Medical Informatics and Biostatistics, University of Medicine and Pharmacy of Craiova, Romania

[3]Department of Occupational Medicine, University of Medicine and Pharmacy of Craiova, Romania

[4]Department of Histology, University of Medicine and Pharmacy of Craiova, Romania

ABSTRACT: Colorectal cancer is one of the most frequently occurring malignancies which associates increasing mortality and morbidity rates. According to data provided by the World Health Organization, colorectal cancer deaths account for approximately 13% of all cancer fatalities. The carcinogenesis of this type of malignancy is a very complex process characterized by various molecular changes which in turn are influenced by factors likes sex, diet, intestinal microbiota, exposure to environmental factors, hosts' immune response and also genetic factors. Our study looked at a total number of 1024 patients, which were all diagnosed with colorectal cancer in a hospital in the north of England, a country that is known for both a high prevalence of this type of cancer but also its robust screening programmers. In our analyses, we concluded that this type of malignancies affected mostly males, aged between 60 and 80. The most commonly affected regions were the rectum, the sigmoid colon and also the cecum. The majority of colorectal cancers (51%) were diagnosed by GPs (general practitioners) or other medical specialties; 43.55% of all cases presented as surgical emergencies and 5.47% were diagnosed through national screening programs. Majority of tumors were diagnosed in late stages, mainly T3 and T4 whilst in was observed that rectal cancers were mainly diagnosed in T2 and T3 stages.

KEYWORDS: *Colorectal cancer, risk factors, diet, staging, anatomical location.*

Introduction

Worldwide, colorectal cancer (CRC) is the second most common type of malignancy in women and the third most common in males, with over 1,36 million new cases being diagnosed every year, accounting for approximately 10% of all newly diagnosed cancers [1,2].

The incidence of colorectal cancer is varying from one country to another and is noted to be in strict correlation with its socio-economic status, meaning that countries with lower socio-economic status normally tend to associate a lower incidence of colorectal cancer. According to World Health Organization data, colorectal cancer accounts for approximately 13% of all cancer deaths [3].

Colorectal carcinogenesis is a multifaceted process characterized by various molecular changes which appear to be directly influenced by factors like sex, diet, intestinal microbiota, exposure to environmental factors and hosts ability to react to these factors (host immunity) [1].

Recent epidemiological studies suggest that factors like obesity and life style (changeable risk factors) have an impact on both CRC incidence and also its morbidity and mortality [4,5].

Other studies have shown that that patients with chronic inflammatory bowel diseases have an increased risk of developing CRC, a risk that is proportionate with the length of illness and also the gravity of both illness and the cumulative inflammatory reaction [6,7].

Patients with long term, extensive colonic inflammation are shown to develop colorectal cancer at a younger age when compared to the general population and they are also more susceptible to developing multifocal colorectal carcinomas.

Hence, worldwide patients should be enrolled in screening programs aimed at detecting colorectal cancer in early stages or identifying premalignant lesions in the hope that early detention triggers early curative intervention prior to developing symphonic illness [8], which in turn would both greatly reduce the cost of overall medical treatment and more importantly increase survival rates.

Current screening programs, mostly operating in developed countries, are mostly aimed at patients that present with high risk factors however they should be extended to include lower risk patients as well [9].

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Our study aims to deliver a clinical and statistical analyses of colorectal cancer cases in an UK hospital, a country that is both known for a high prevalence of colorectal cancer but also for its screening programs with a view of comparing these results to similar data collected in Romania.

Material and Methods

The study included a group of patients, admitted to Darlington Memorial Hospital; this is an emergency hospital situated in the town of Darlington, United Kingdom which looks after the population in county Durham, a county located in the north of England.

This particular hospital was chosen because, between 2012 and 2016, the author (Dr Daniel Sorin Ilie) was privileged enough to work part of the Darlington Memorial Hospital surgical department as a General Surgery Specialist doctor.

Utilization of non-identifiable patients dataset of County Durham and Darlington NHS Foundation Trust Hospital for academic research purposes has been approved before preparing this study.

We were extremely interested in seeing if, though data analyses, we can see any notable differences between colorectal cancer cases diagnosis in England compared to Romania when we looked at characteristics like prevalence, patients sex and age, tumor staging, anatomical distribution and also 5-year mortality rate.

Darlington memorial Hospital is managed by County Durham and Darlington NHS Foundation trusts.

This NHS trust of one of the biggest NHS organizations in the United Kingdom, offering medical services to over 650 000 people.

The researched database included information about all the patients that received a diagnosis of colorectal cancer at Darlington Memorial Hospital over a period of approximately 11 years (2005-2016).

The information included in the database included patients age, ethnicity, sex, date of diagnosis as well as the type of malignancy and type of intervention used (surgical intervention, chemotherapy or radiotherapy).

All the data were recorded in Microsoft Excel which allowed completion of a statistical analyses and the creating of relevant charts and graphs relating to studied parameters.

Results

The study comprised of analyzing data obtained from 1024 patients that were diagnosed with colorectal cancer between 2005 and 2016.

Sex distribution analyses showed that from the total 1024 patients, 619 (60%) were male patients and 405 (40%) were female patients (Figure 1), which indicates and overall higher incidence of this type of malignancy associated to male gender.

Possible explanation for this finding could be risk factors which are more commonly associated with male life style, like increased alcohol intake and smoking.

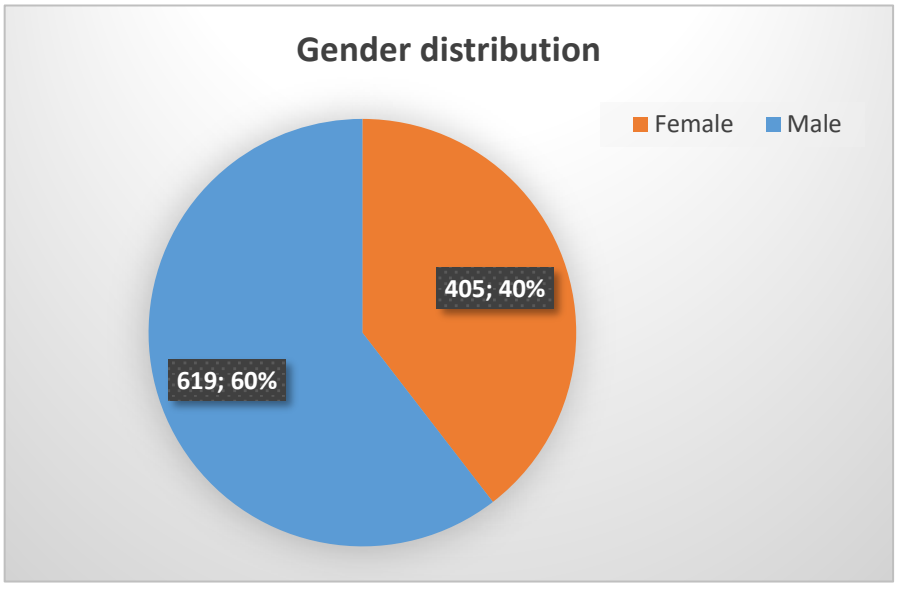

Figure 1. Patients age distribution.

Age related analyses for our cohort of patients showed that this type of pathology can affect various age groups from young adults to elderly population.

Amongst our male patients the youngest patient was aged 22 at the time of diagnosis whilst the eldest one was 95 years old; in the female patients the youngest was 22 when diagnosed with colorectal cancer whilst the eldest was 100 years old.

As you can see from our graphs (Figures 2 and 3) the number of patients diagnosed with colorectal cancer is directly proportionate to the increase in age.

From the total number of patients, the age distribution showed that 41 to 50-year-old decade accounted for 51 case whilst for the 51 to 60-year-old decade the number of cases had tripled to 145 patients; majority of cases were recorded for the 61 to 70-year-old decade which accounted for 263 cases and also the 71 to 80-year-old decade with 343 patients of this age group being diagnosed with colorectal cancer.

Therefore, out of the total number, 606 patients were aged between 61 and 80 at the time of diagnoses amounting to approximately 59,18% of all newly diagnosed cases.

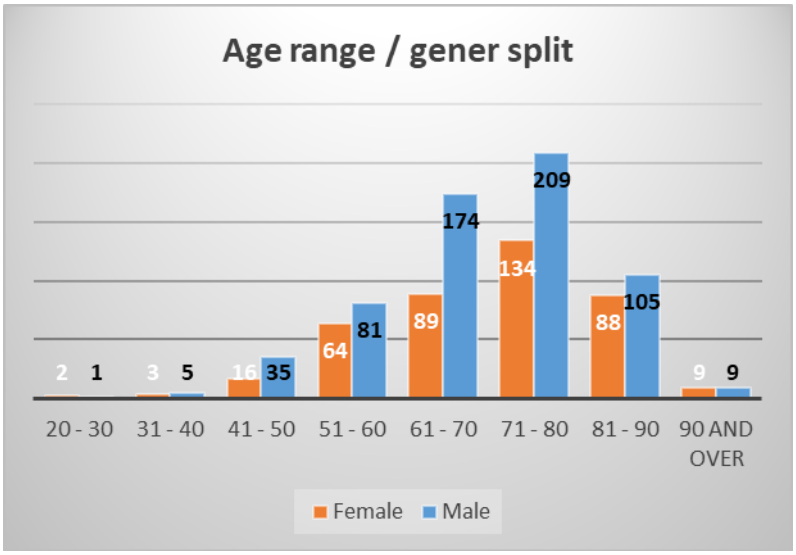

Figure 2. Age and sex distribution of colorectal cancer cases.

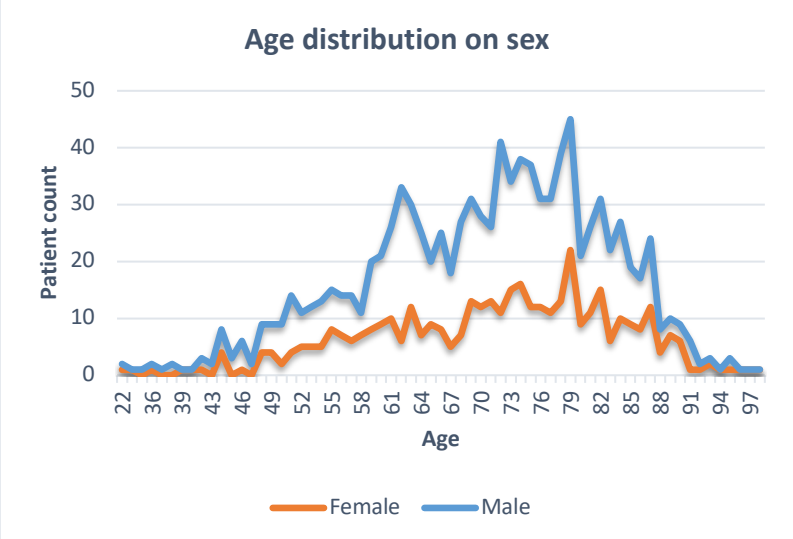

Figure 3. Distribution of cases based on age and sex.

There is an apparent decreasing trend with fewer patient being diagnosed over the aged of 80 which in reality does not mean that the risk of developing colorectal cancer decreases with age however it is likely attributed to the fact that there are fewer people over the age of 80 compared to younger age groups; people aged 80 or above were more likely to pass away

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due to other conditions prior to the diagnosis of malignancy.

Another very interesting aspect that we noted part of our study was the fact that across all age groups the number of male patients diagnosed with colorectal cancer, remained significantly higher than that of the female patients.

Likewise, in our graphs there are two notable spikes when it comes to age related incidence, the first one being around the age of 62 and second around the age of 80.

Our study comes to demonstrate that increasing age strongly correlated with an increased risk of developing colorectal cancer.

In terms of colorectal cancer anatomical distribution this was noted to be very varied.

In our study we noted that for the majority of patients, 627 (61,23%) were diagnosed with colon cancer (cancer located in the cecum, ascending, descending or sigmoid colon); 362 patients (35,35%) were diagnosed with rectal cancer and for 35 patients (2,45%) the malignancy was located at the rectosigmoid junction (Figure 4).

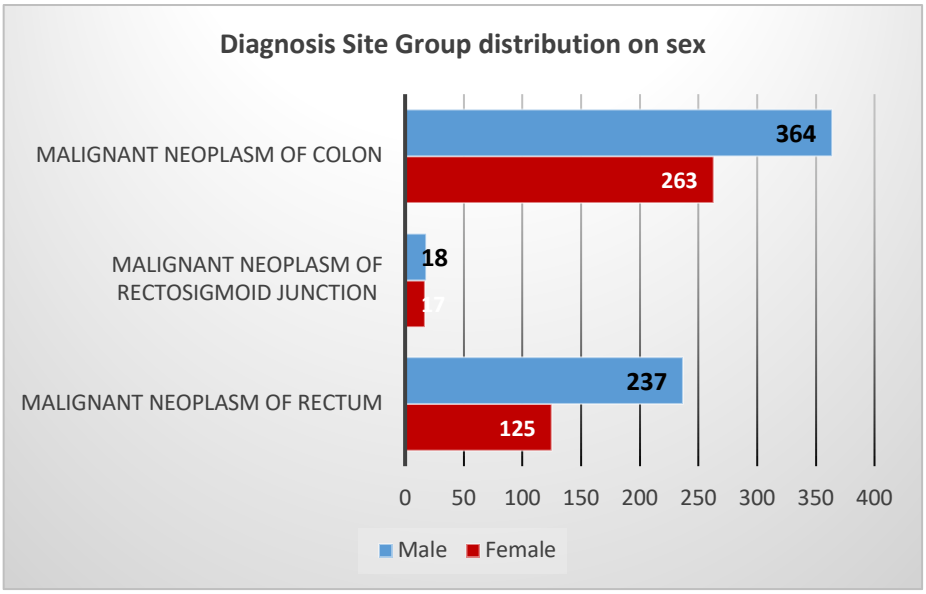

Figure 4. Distribution of anatomical site, colon or rectal cancer, based on sex.

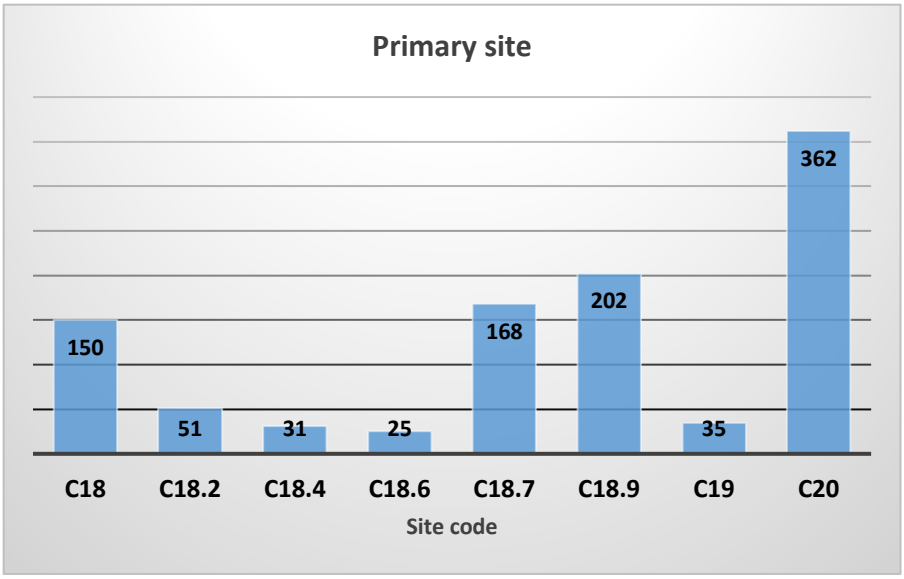

Figure 5. Primary tumor location (C18.0=malignancy of the cecum; C18.2=malignancy of the ascending colon; C18.4=malignancy of the transverse colon; C18.6=malignancy of the descending colon; C18.7=malignancy of the sigmoid colon; C18.9=malignancy of the colon, primary tumor location unspecified; C19=malignancy of the rectosigmoid junction; C20=malignancy of the rectum).

For colon cancers the distribution was very diverse.

The cecum was affected as the primary site for 150 patients (14,65%); the tumor was located in the ascending colon for 51 patients (4,98%); the transverse colon was involved in 31 cases (3,03%); 25 patients (2,44%) were diagnosed with tumors primarily located in their descending colon and for 168 (16,41%) patients the sigmoid colon was affected. For 202 patients (19,73%) it was impossible to locate the primary tumor site.

The rectosigmoid junction cancers accounted for 35 cases (3,41%) whilst rectal tumors were diagnosed for 362 patients (35,35%).

From this study we concluded that the most common site at the time of diagnosis was rectum (35,35%) followed by sigmoid colon (16,41%) and cecum (14,65%) were the intestinal transit is much reduced.

When we analyzed the anatomical distribution against the patient's sex we noted that transverse colon and descending colon localizations were slightly more frequent in female patients whilst all others sites including cecum, sigmoid colon and rectum were more likely to be diagnosed as primary tumor sites in males (Figure 6).

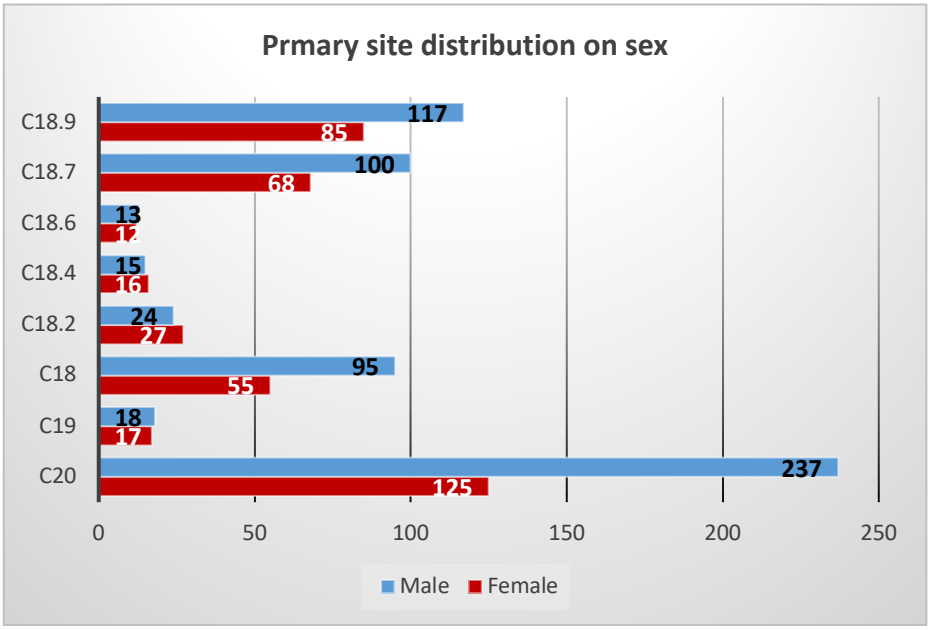

Figure 6. Relationship between primary tumor location and patients sex.

Diagnosis of colorectal cancer was assigned through three different pathways:

- presentation to the local emergency department with an acute surgical complaint like severe abdominal pain, hemorrhage or bowel obstructions;
- through assessment and investigations completed in the local GP surgeries or referral from other specialties;
- through the national screening programs.

As you can see from Figure 7 the majority of colorectal cancer cases were diagnosed following presentation to the local emergency services; in these cases urgent surgical treatment was needed; these were followed, in 2nd place, by tumors diagnosed by either GP (general practitioners) or other medical specialties (diagnosed mainly through imagistic methods); in terms of number of patients diagnosed the 3rd place was occupied by colorectal cancers picked up through nations screening programs.

It was noted that rectal cancers were most often diagnosed by general practitioners (GPs) and other medical specialties; followed by diagnosis through presentation to emergency services and last by rectal cancers diagnosed through national screening programs.

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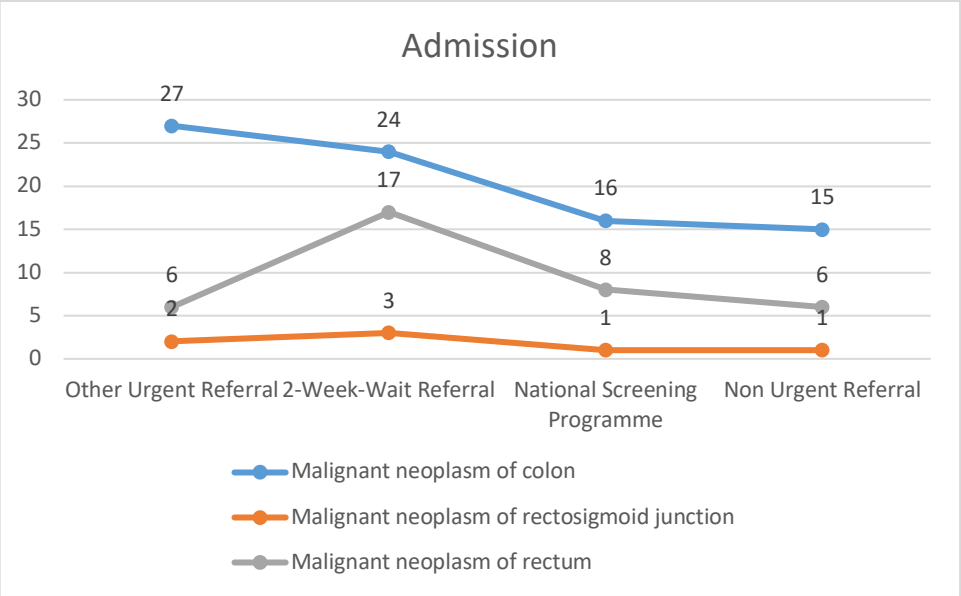

Figure 7. Diagnostic pathways for colorectal cancers.

Rectosigmoid junction cancers were almost equally diagnosed through the three diagnostic pathways.

Analyzing the entire database, we concluded that 446 patients (43,55%) were diagnosed with colorectal cancer after presenting to the emergency services with acute surgical complaints and subsequently undergoing surgical interventions.

Another 552 patients (53,90%) were diagnosed by their general practitioner or other medical specialties; for these cases the surgical treatment could be delayed by up to 2 weeks allowing completion of a more thorough pre-operative assessments.

For 56 cases it was the national screening programs that first highlighted the diagnosis which allowed a significant longer delay between diagnosis and surgical treatment (Figure 8).

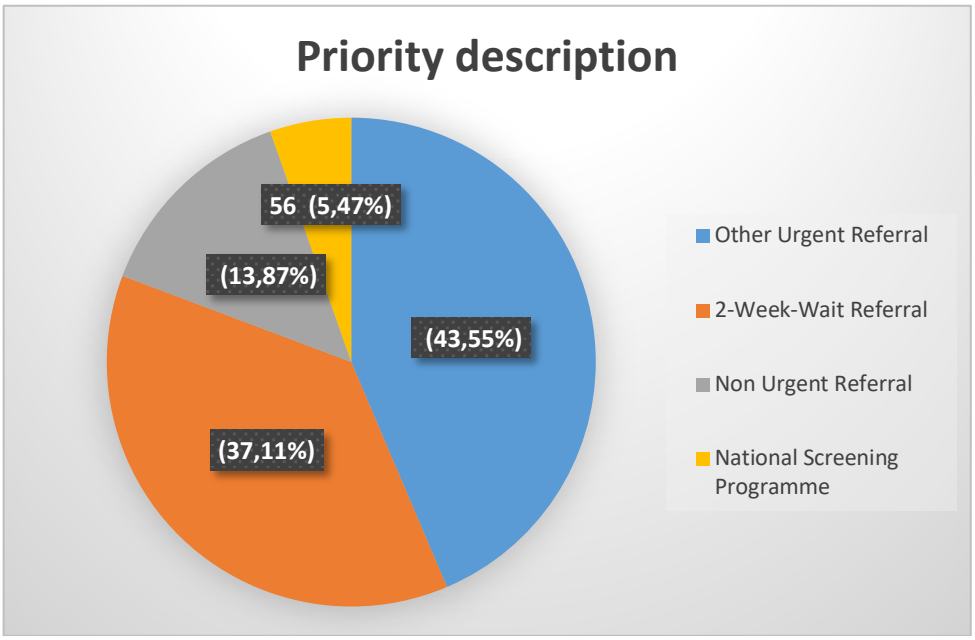

Figure 8. Diagnostic pathways and surgical treatment of colorectal cancers.

In regards to tumor staging at the time of diagnosis majority of colon cancers were diagnosed in stages III and IV (T3, T4); whilst rectal cancers were mainly diagnosed in stages II and III (T2, T3) (Figure 9).

When analyzed the data relating to mortality rates we concluded that patients diagnosed with colon cancer had better survival rates compared to patient with cancer of the rectosigmoid junction or patients with rectal cancer (Figure 10).

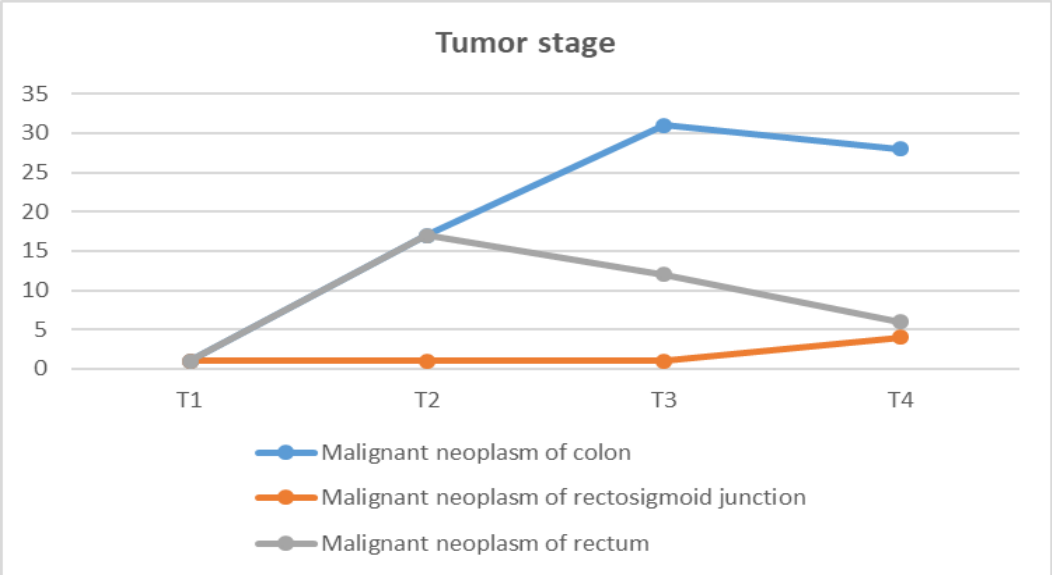

Figure 9. Tumor staging at the time of diagnosis.

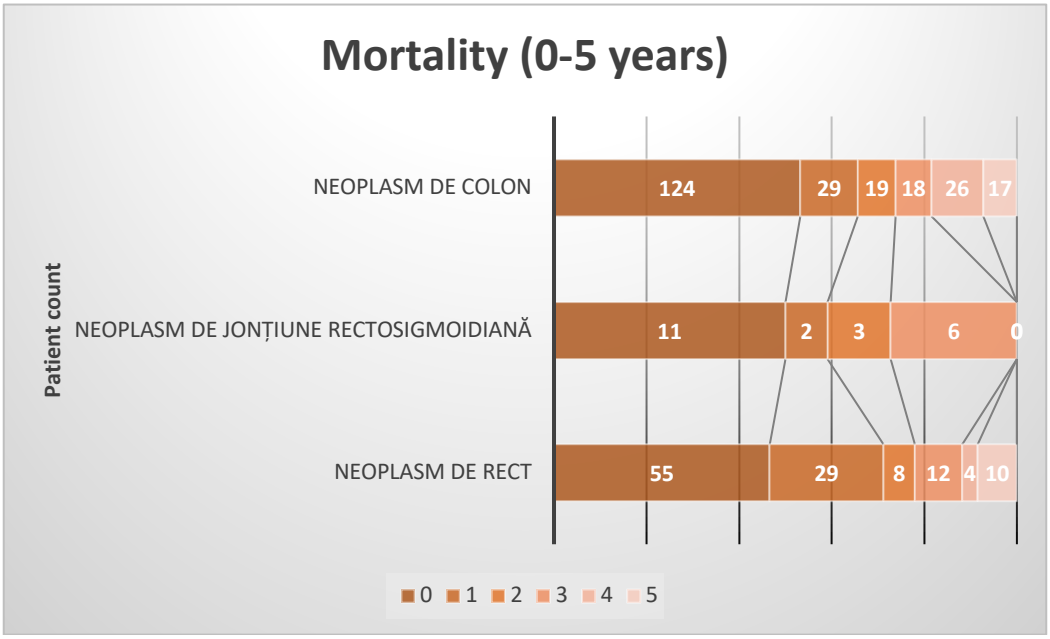

Figure 10. Colorectal cancer mortality rates.

Discussions

Despite huge concentrated efforts from both national health systems and research institutes worldwide, numerous oncological studies continue to demonstrate that malignancies remain a major public health concern though their high incidence, increased morbidity and mortality and high social and economic impact. World Health Organization approximates that worldwide fatalities secondary to cancers account for approximately 13% of all deaths.

Colorectal cancer is the 3rd most commonly diagnosed malignancy in the world and one of the most frequent causes of death; in women this

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is only surpassed by pulmonary and breast cancer [10].

Also, worldwide data suggests that both the incidence and mortality in populations aged 65 and over is higher for female gender compared to males indicated that colorectal cancer is a major threat to female health, especially for those of a certain age [10].

Studies completed in South Korea and Japan have shown that in these countries, colorectal cancer is the leading cause in terms of morbidity affecting females aged 65 and over [11,12].

Our study, completed on a patient lot in England showed that majority of colorectal cancers were diagnosed in male patients whilst a similar study completed between 2005 and 2009 on 317 patients diagnosed with colorectal cancer at The Emergency County Hospital in Craiova showed that this type of malignancy affected mostly women [13].

Numerous studies showed a great variation in terms of colorectal cancer morbidity and mortality which is likely influenced by the variability in risk factors like diet, smoking, alcohol intake, aging, sedentary life style, obesity and genetic factors [14,15].

Role of nutrition in colorectal cancers was considered in depth and it is widely accepted that a diet high in saturated fats and red meat is a risk factor associated to colorectal cancer similarly to how a diet high in fibers has a protective role against this type of malignancy [16].

Another major risk factor strongly associated with colorectal cancer is smoking. In western countries, particularly the United States of America the reduction in smoking and the also colorectal national screening programs have led to a reduction in both morbidity and mortality secondary to this type of malignancy.

If smoking is decreasing in developed countries some of the developing nations in South America, Asia and Africa are currently seeing an increase in this habit [17], countries that also associate an increasing prevalence of colon and rectal cancer.

For example, the current prevalence of smoking amongst men that live in western countries including USA is approximately 20% whilst in countries like China, Indonesia, Greece and Jordan smoking rates amongst men are currently estimated at approximately 60% [17].

Overall both smoking and some dietary habits have been identified as clear risk factors for colorectal cancer in developed countries whilst in developing countries infectious agents are recognized as strong risk factors for this type of malignancy.

However, these factors are rapidly changing as developing countries are seeing changes in their life style and dietary habits with higher intake of saturated fats, also higher consumption of foods high in calories and low in fibers and increase in sedentary life style all of which lead to increased rates of colorectal cancer worldwide [18-21].

Despite the increasing incidence of colorectal cancer some parts of the world are seeing a decrease of death rates associated with colorectal cancer.

This is likely due to a combination of improvements and developments in terms of treatment option but also early recognition and detention of malignant or premalignant lesions [22].

Despite this, mortality is on the increase in countries with limited resources and less developed health systems including countries like Mexico and Brazil in South America and Romania in Eastern Europe.

In our study we highlighted a clear link between increase in age and colorectal cancer morbidity.

Therefore, we concluded that increasing age represents a clear risk factor for developing colorectal cancer.

Similar studies suggest that in the future the economic burden of cancer will be increasing especially in developing nations, mainly due to a combination of increased life expectancy, increased number of elderly population and likely an overall increase in the total number of the population [23] (Thun MJ, DeLancey JO, et al, 2010).

The estimates suggest that in the developing world the percentage of newly diagnosed cancer cases will increase from 56% in 2008 to over 60% in 2030 (Ferlay J, Shin HR, Bray F, et al, 2010).

Also there is a strong indication that cancer will overtake ischemic heart disease as a leading cause of death [25].

As demonstrated by our study cancer can emerge and develop in any part of the colon or rectum.

However, we could still conclude that some parts of the intestine were more prone to host malignancy changes.

Our analyses showed that the majority of tumors were primarily linked to the rectum (35,35%), followed by the sigmoid colon (16,41%) and the cecum (14,65%).

From our observation we can conclude that segments of the large bowel that naturally have a reduced peristalsis are more prone to malignant transformation.

Other studies have shown that right colon malignancies tend to affect women more compared to left colon malignancies that are more frequently diagnosed in males [26,27].

In regards to 5-year mortality rates our study has shown that patient with colon cancer appeared to have better survival rates compared to those with rectal cancer or rectosigmoid junction cancer.

Some studies have demonstrated that 5-year survival rates for colorectal cancer vary from between 28% to 42% in developing countries [28] to just over 60% in developed countries like United States, Japan or Switzerland [29].

Because of its morbidity, mortality and high social and economic burden we consider extremely important that preventive measures are put in place worldwide in order to reduce the incidence of colorectal cancer.

These measures must include promoting a healthy diet which includes lowering red meat intake, decreasing alcohol intake and increasing fruit and vegetable consumption, reducing the amount of saturated fats in our diet and also reducing and if possible, stopping smoking altogether alongside implementing rigorous national screening programs which will enable early detention of lesions like premalignant polyps and also early stages colorectal cancers [30].

Conclusions

Colorectal cancer represents a major public health issue worldwide, due to its high morbidity and mortality and increase socio-economic burden.

In our study colorectal cancer was more frequently diagnosed in males, when compared to females or similar age groups. Colorectal cancer morbidity was noted to increase with age, especially after the age of 50, reaching a peak between the ages of 61 and 80.

The majority of newly colorectal cancers were firstly diagnosed via GP surgeries or other medical specialties, however 43,55% of patients were diagnosed following acute presentation to emergencies services which also meant that they were subjected to emergency surgical interventions.

Primary colorectal tumor was most often located on the rectum, sigmoid colon or cecum at the time of diagnosis.

Conflict of interests

None to declare.

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Corresponding Author: Mircea-Sebastian Şerbănescu, Department of Medical Informatics and Biostatistics, University of Medicine and Pharmacy of Craiova, 2 Petru Rareş Street, 200349 Craiova, Dolj County, Romania, e-mail: mircea_serbanescu@yahoo.com