A Comparative Study of Rectal and Colonic Carcinoma: Demographic, Pathologic and TNM Staging Analysis

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ABSTRACT

Objective: The aim is to determine the relative frequency of rectal carcinoma in a large recent surgical series. In addition, rectal carcinoma is compared with colonic carcinoma with regard to demographic data, histological types and TNM stages.

Patients and Methods: A retrospective pathologic study was conducted on 215 patients with colorectal carcinomas, all treated by radical surgery during the years 2003-2005. Tumors of unfavorable histology included: Mucinous carcinoma, signet-ring carcinoma and undifferentiated carcinoma. For tumor staging, the international TNM staging system was adopted.

Results: The mean age was 51 years and male to female ratio was 1.1. Rectal tumors contributed only 27% of cases, contrary to much higher previous reports from Egypt. Tumors of unfavorable histology constituted 24.2% of cases. Patients presented at advanced stages (78.6% stages II and III) with 46.5% lymph node metastases. Patients with rectal carcinomas were younger, with more risk of suboptimal distal surgical margins.

Conclusions: Egyptian patients with rectal carcinoma are younger than those with colonic carcinoma. Otherwise, patients with rectal carcinoma are similar to colonic carcinoma with regard to sex distribution, histological types and TNM stages.

Key Words: Colorectal cancer – Pathology – Stages.

INTRODUCTION

Globally, colorectal carcinoma is the third most common cancer in the world, contributing 8.9% of all cancers [1]. The disease is more common in developed than in developing countries and this is attributed to differences in diet [2]. Thus, in developed countries, the high consumption of fat in diet is associated with increased risk of colorectal cancer, whereas, in developing countries the mostly vegetarian diet plays a protective role [3]. In USA colorectal cancer constitutes 9.5% of all cancers, whereas, in Egypt it constitutes 6.5% of all cancers [3]. The site distribution of colorectal cancer also varies in developed and developing countries. Thus, in USA rectal carcinoma constitutes 25% of all colorectal cancer but in Africa it is 50%. The high frequency of rectal carcinoma (75%-79%) was emphasized in early reports from Egypt, published fifteen years ago [4,5].

The geographic variation in the incidence of rectal carcinoma could be related to dietary and/or genetic factors [3]. The impact of genetic factors on both site distribution, sex affection and histopathological type of colonic cancer is documented in hereditary non-polyposis colonic cancer (HNPCC). In this condition, tumors are more common in females, are often mucinous in type and are located more on right side of colon.

The present study has two objectives. First, to determine the relative frequency of rectal carcinoma in a large recent surgical series of colorectal cancer in Egyptian patients, and to determine if it corresponds to the high incidence areas in Africa or low incidence areas in the West. The second aim of study is to determine if rectal carcinoma is different from colonic carcinoma with regard to demographic features, pathological types of tumors or TNM stages. To the best of our knowledge, such comparative study has not been previously reported.
PATIENTS AND METHODS

This retrospective study was based on 215 patients, all treated by radical surgery at NCI, as well as, private cases during the 3 years 2003-2005. The studied patients were consecutive in the specified time interval. The surgical operations done included: 157 colectomies, 31 abdominoperineal resections and 27 sphincter-preserving operations. All patients were free of distant metastasis. Carcinoma of anal canal was not included in this study. In the present study, five major anatomic sites of the tumors were recognized, namely: The right colon including the hepatic flexure, the transverse colon, the left colon including the splenic flexure and the sigmoid including the rectosigmoid region and finally the rectum.

For pathologic tumor staging, the TNM system was adopted [6]. The definitions of the individual TNM categories of colorectal carcinomas are shown in Table (1). In patients with multiple tumors, the stage of the highest T-category was considered. The definitions of stage groupings were as follows: Stage 0 (Tis N0 M0), stage I (T1 or T2 N0 M0), stage II (T3 or T4 N0 M0), stage III (any T N1 or N2 M0) and stage IV (any T or N M1).

Considering the evaluation of surgical margin of excision, a clearance less than 2cm [7] was considered inadequate. Adenocarcinomas were classified into favorable and unfavorable types [8]. Favorable tumors included gland-forming adenocarcinomas, whereas, unfavorable tumors included mucinous carcinomas, signet-ring adenocarcinomas and undifferentiated carcinomas [8].

For statistical evaluation, quantitative data were expressed as means and standard deviation, whereas, qualitative data were presented as number of cases and percentages. The Statistical Package for Social Sciences (SPSS) was used for computer data analysis. Chi-square and Fisher exact test were used for comparing independent proportions. Non-parametric Chi-square test was used to test goodness of fitness. Student-t-test was used for comparing mean values, and p value was always 2 tailed and considered significant at 0.05 level.

RESULTS

The site distribution of tumors is presented in Table (2). The left colon was the most common site affected (30.2%) and rectal cancer contributed 27% of cases. Demographic and pathologic features are presented in Table (3) with comparison of data between colon and rectum. The mean age of the entire series was 51 years but patients were younger for rectal cancer (46.5%) than colonic cases (52.7%) and the difference was statistically significant (p value 0.005). The series included 114 males and 101 females, a sex ratio of 1.1. There was also no significant difference in this sex ratio when data of colon and rectum were compared (p value 0.48).

In two patients (0.9%) the carcinoma of colon was associated with multiple polyposis (Fig. 1). In three patients (1.4%), the carcinomas were found in solitary adenomatous polyp, with invasion of submucosa (T1). Multiple carcinomas were encountered in 8 out of the 215 cases studied, a frequency of 3.7%. The mean largest tumor diameter for the entire series was 5.7cm (Table 3). There was no significant difference between tumor size of rectal and colonic cases, with mean sizes of 5.6cm & 5.8cm respectively and a p value of 0.08 (Table 3).

Histologically, carcinomas were classified into favorable and unfavorable types. Favorable tumors contributed 163 cases (75.8%) and were characterized by prominent gland formation with mild to moderate anaplasia and absent mucin secretion (Fig. 2). Unfavorable histology was observed in 52 cases (24.2%) and this class included high grade tumors with intracellular or extracellular mucin secretion (Figs. 3,4), as well as, undifferentiated carcinomas. The frequency of unfavorable tumors was slightly higher in rectal tumors (25.9%) than colonic tumors (23.6%), but this difference was not statistically significant with p value of 0.24 (Table 3).

Out of the 215 cases studied, only 4 patients (1.9%) had suboptimal distal surgical margin, with tissue clearance from tumor edge of less than 2cm. Two of these cases were observed in 58 patients with rectal carcinomas, a relative frequency of suboptimal margin of 3.4% and both patients had sphincter preserving operations. The other two patients were encountered...
among 157 cases of cancer colon studied, a relative frequency of 1.3%.

The results of TNM pathologic staging, namely T and N categories are presented in Tables (4,5) respectively. Most of the cases (72.6%) belonged to the advanced T3 and T4 categories, whereas T1 and T2 contributed 27.6% of cases (Table 4). The relative frequency of T categories between colon and rectum showed no significance difference with \( p \) value of 0.49 (Table 4). Of the total series of colorectal carcinoma 100 cases (46.5%) had regional lymph nodes metastasis (Table 5). Metastasis in 1-3 nodes (N1) contributed 55 cases (25.6%), whereas 4 or more positive nodes (N2) contributed 45 cases (20.9%). The frequency of node metastasis in rectal and colonic carcinomas was not statistically significant (\( p \) value of 1.6). The histologic type of tumor has a significant impact on the incidence of lymph node metastasis (Table 6). Thus, the frequency of lymph node metastasis with unfavorable carcinomas was 69.2%, compared to a frequency of 39.9% with tumors with favorable histology; a difference which proved to be statistically significant (\( p \) value of 0.015). The same results were obtained when the analysis was repeated for rectal cases and colonic cases separately. The stage grouping for the entire series was as follows: Stage I 46 cases (21.4%), stage II 69 cases (32.1%) and stage III 100 cases (46.5%).

Fig. (1): Colectomy specimen showing ulcerative carcinoma of the colon with associated multiple polyps.

Fig. (2): Gland forming adenocarcinoma of the colon (Hx & E, X100).

Fig. (3): Signet ring cell adenocarcinoma of the colon (Hx & E, X400).

Fig. (4): Mucinous adenocarcinoma of the colon with extracellular mucin production (Hx & E with alcian blue, X400).
In the present study, the mean age was 59 years, and was younger in rectal carcinoma (46.5 years) than colonic carcinoma (52.7 years). The age incidence in Egyptian patients is much younger than that reported in the west, where the mean age is about 65 years [3]. This young age incidence in our series is probably due to the young age structure of the Egyptian population [9].

In our study, both sexes were affected almost equally, with insignificant male predominance (sex ratio of 1.1), and no male predominance was observed in rectal carcinoma. This result was different from early reports from NCI, Cairo in which males predominated five times over females [5]. In western literature, a slight male predominance was reported [8], more in rectal tumors (sex ratio of 1.6) than colonic tumors (sex ratio of 1.3).

In the present report, the distal colon (left colon and sigmoid colon) was the most common site of carcinomas, contributing 50.2% of cases, followed by the rectum, which constituted 27% of cases. This finding is similar to the site distribution of colorectal carcinomas reported from developed countries [3], where the distal colon was affected in 53% of cases and rectum in 25%. Conversely, our observation is quite...
different from early publication from NCI, Cairo, in which rectal carcinomas constituted 75 to 79% of cases [4,5]. This report was published 15 years ago in the era before routine use of colonoscopy, hence rectal tumors which are more accessible, were more easily diagnosed than colonic tumors.

Two histopathological features are important to predict treatment outcome, namely: The carcinoma subtype and the adequacy of surgical margins. In the present study, 52 patients (24.2%) had unfavorable histology, which included mucinous, and signet-ring adenocarcinoma, as well as, undifferentiated carcinoma. This group of tumors is known to have unfavorable prognosis [8] and our study demonstrated their association with higher frequency of lymph node metastases (69.2%) as compared to favorable tumors (39.9%).

The clearance of normal tissue is defined as the distance in centimeters from the gross edge of the tumor to the surgical margin. The distal clearance was usually shorter than the proximal one and a distance of two centimeters or more is considered adequate [7]. In our study a suboptimal distal clearance (<2cm) was observed in only four patients (1.9%), but was more common in rectal than colonic resections due to the adoption of sphincter-preserving surgery in the former.

The TNM staging system was adopted in the present study, since it is internationally accepted and has several advantages over other staging systems [10]. First it has a comprehensive set of definitions and rules of application that insure uniform use. Second, the system allows continuous improvement based on review of existing data. Our results indicated that Egyptian patients presented as advanced stage, with 72.6% of tumors at T3 and T4 categories, as well as, 78.6% at stages II and III. In a comparable series from USA, only 42.9% of tumors were at T3 and T4 categories [11]. Existing data indicate that the deeper the tumor invades into the perimuscular tissue, the worse is the prognosis [12]. Extramural extension into the fat exceeding 5mms, appears to be the critical cutoff point to adverse outcome. Accordingly, subdivision of T3 into two subgroups is advisable [6]. Another difficulty in T3 evaluation is the tendency for under diagnosis of serosal involvement (T4) by pathologic studies and reporting these cases as T3. It has been shown that cytologic examination of serosal scrapings revealed malignant cells in 20% of cases, originally categorized as T3 [13].

Malignancy in a polyp was observed in two patients in the present series and represents an early cancer which is more amenable to cure. Its proper management requires precise staging of the carcinoma. Thus, in tumors limited to the mucosa (Tis) polypectomy alone is sufficient, since the mucosa of colon lacks any lymphatics. Conversely, tumor invading the submucosa (T1), which is rich in lymphatics, usually requires colectomy, since the risk of recurrence is about 10 to 25% of cases [18]. Histopathologic parameters that are known to be associated with high risk include: High grade tumors, tumors less than 1mms from surgical margin and lymphatic permeation [16].

Regional lymph nodes metastases were observed in 46.5% of patients of the present series (25.6% N1 and 20.9% N2). This frequency is higher than a figure of 42.6% reported from USA [11]. The locations, as well as, the number of positive lymph nodes are prognostically significant. Thus, node metastases at apical nodes in root of mesentery are more serious than positive nodes close to the tumor, and patients with more than six positive nodes have 5-year survival of less than 10% [17]. Minimal metastatic disease in lymph nodes includes: Isolated tumor cells (ITC) and micrometastases less than 2mms. The biologic significance of these lesions is unknown [18].

It is concluded from this study that colorectal carcinomas affect Egyptian patients at a young age, with advanced stage of presentation. Patient with rectal carcinomas were younger than colonic carcinomas and had more risk of suboptimal distal surgical margin. Otherwise, rectal carcinoma is similar to colonic carcinoma in sex distribution, histological types and stages. Histological tumor subtype, stage and adequacy of surgical margin are important risk factors.

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A Comparative Study of Rectal & Colonic Carcinoma


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