Egyptian Journal of Surgery Vol. (20), No. (2), April, 2001

RESULTS OF MANAGEMENT OF COLORECTAL CARCINOMA

By
Mansour M. Kabash* , Ali Abd El-Rahman Abd-Alla**, Ahmed Hassan and Abdel-Hadi Omar****.***
Surgery, Radiotherapy and Microbiology and Immunology Departments*, **,***, South Valley University
Pathology Department **** , Assiut Faculty of Medicine.
Egypt.

Background: Colorectal cancer is the only commonly curable visceral malignancy constituting a significant problem as its outcome has remained poor and nearly unchanged over the last 25 years. This study has been performed to outline results of management of colorectal carcinoma.

Patients and Methods: 78 patients with colorectal carcinoma included in this study with Dukes'A, B and C stages. Investigations, surgical treatment and histopathological studies were carried out. Adjuvant treatment was adopted in selected cases. Carcinoembryonic antigen estimation was performed. Follow-up in only 73 patients was carried out, who passed the postoperative period (4 weeks). Patterns of relapse and overall survival were outlined in follow-up cases for 42 months.

Results: Relapse was encountered in 45.2% of patients. Most patients with Dukes'C had relapse (79.3%) and to less extent those with Dukes'B (23.5%). 42.9% of rectal carcinoma showed local relapse and 25% of colonic carcinoma showed local relapse. 87.5% of patients with mucinous carcinoma showed relapse and only 33.3% of non-mucinous carcinoma showed relapse. Overall survival was 51% at 42 months according to the Kaplan-Meier method. Patients with Dukes'A had the best survival rate (80%), followed by Dukes'B (64%) and Dukes'C (27%). Dukes' stages, type of pathology and relapse of tumor had a statistically significant difference on overall survival.

Conclusion: This study outlined results of management of colorectal carcinoma and guidelines of surgical and adjuvant treatment.

Keywords: Colorectal carcinoma - Anterior resection - abdominoperineal resection - CEA.

INTRODUCTION

Colorectal cancer is a significant problem worldwide. Although surgical resection for possible cure can be attempted, outcome remains poor, largely as a result of the advanced stage of the disease at the time of initial presentation. It has remained unchanged over the last 25 years [(1)(2)]. The overall survival after curative resection for colorectal cancer averages about 50% while local recurrence reaches 30 to 40% [(3)].

The results of surgical treatment alone remain fairly static. At the time of presentation 50% of patients had clinical evidence of tumor fixity, and 25% had distant metastases. The overall resectability rate was 70.8%. Operative mortality was 13.8% and approximately 70% of patients undergoing curative resection survived for 2 years and 50% for 5 years. This disease has advanced nature at presentation with a high incidence of emergency presentation [(4)]. Understanding patterns of recurrence and features that predispose to them may be a guide in treatment and select adjuvant therapy and recommendations for targeted surveillance in follow-up [(5)].

The aim of this study is to highlight results of management of colorectal carcinoma: perioperative complications, relapse and overall survival and variables affecting relapse and overall survival of patients with Dukes'A, B and C stages, which form guidelines in surgical and adjuvant management.

PATIENTS AND METHODS

I. Initial presentation and treatment (78 patients):

This study included 78 patients with colorectal carcinoma treated in Sohag University Hospital in the period from May 1995 to January 2000. Criteria of patient selections encountered those with Dukes'A, B and C stages according to Dukes' staging of colorectal cancer. Exclusion criteria included patients with distant metastatic disease, fixed tumour, gross residual pathology, patients with palliative diversion or laparotomy alone and those with poor medical risk.

All patients were subjected to full history and complete physical examination. Radiological and endoscopic investigations were carried out and selected according to the mode of presentation. The studies included abdominal u/s, abdominal plain x-ray (erect), chest plain x-ray, CT abdomen and pelvis, barium enema, sigmoidiscopy, colonoscopy, endorectal u/s and diagnostic laparoscopy. Laboratory investigations included blood picture, liver function tests, blood urea, serum creatinine, blood glucose, stool and urine examinations. Carcinoembryonic antigen (CEA) was done preoperatively and 3 weeks postoperative.

Surgical procedures were performed according to the presentation and operative findings. The aim of resection was to excise tumor-bearing bowel with adjacent mesocolon or mesorectum and regional lymph nodes with adequate clearance. Perioperative morbidity and mortality were reported.

Histopathological study was performed for diagnosis of tumors, types, degree of differentiation and Dukes' staging in all cases. The study of sections was stained with Hx and E for this routine histopathological examination.

II. Follow-up studies (73 patients):

CEA estimation:

Many methods of CEA measurement have been described. In our study we used the ABBOTT IMX MEIA, which is a fully automated ELISA model based on microparticle enzyme immunoassay pioneered by ABBOTT-ABBOTT PARK, IL, USA. Serum samples were separated and assayed within 24 hours. Results were reported in ng/ml, where the normal range is up to 5 ng/ml for non-smokers and 10 ng/ml for smokers.

Adjuvant treatment:

Adjuvant chemotherapy was adopted and selected in follow-up patients. It was given to all patients with rectal carcinoma of stages B and C (18 out of 21 patients), and to 21 out of 52 cases of colon carcinoma of stage C. 5-fluorouracil in a dose of 450 mg/m2/day for 5 days plus calcium leucovarine in a dose of 20 mg/m2/day for 5 days every 28 days for one year. Postoperative radiotherapy was given to 18 patients with rectal carcinoma of Dukes'B and C who had positive nodal involvement or deep muscle invasion in a dose of 50 Gy/5 weeks, 2 Gy/fractions/day, via 3 or 4 fields to the whole pelvis using 6 MV photon beam.

Follow-up:

Follow-up of 73 patients (21 patients with rectal cancer and 52 patients with colonic carcinoma) was carried out, as 5 patients who died postoperatively were excluded from follow-up studies. Follow-up was done regularly every 3 months in the first 2 years, 6 months in the 3rd and 4th years. The follow-up ranges between 12 and 42 months. Patients who were lost during follow-up were considered in the mortality group (10 patients). Clinical examination, chest x-rays, u/s or CT scan of the abdomen and pelvis were performed. Colonoscopy or barium enema were done 1 year after surgery. CEA was measured every 6 months in this study and estimated as normal or elevated. Diagnosis of locoregional recurrences and distant metastases was detected.

Statistical studies:

Overall survival with different variables was done at 42 months according to Kaplan-Meier method. Chi-square test was used to determine the difference between important variables affecting overall survival.

RESULTS

(I) Initial presentation and treatment (78 patients):

This study included 78 patients with colorectal carcinoma (35 male patients and 43 female patients), age range from 18-72 years old with average age of 43 years old. Clinicopathological staging of Dukes'A was encountered in 10 patients (12.8%), Dukes'B in 36 patients (46.2%) and Dukes'C in 32 patients (41%). Histopathological examination showed adenocarcinoma (non-mucinous) in 61 patients (78.2%) and study of grades revealed grade I in 4 patients (6.5%), grade II in 26 patients (42.6%), grade III in 27 patients (44.3%) and grade IV in 4 patients (6.5%). Mucinous carcinoma was found in 17 patients (21.8%).

Clinical features:

Acute abdomen was found in 27 patients (34.6%).

Acute intestinal obstruction was the commonest form of emergency presentation and was encountered in 25 patients (32.1%), 5 cases of these were resolved on conservative treatment and completed as elective surgery. Chronic abdominal troubles were encountered in 51 patients (65.4%). Palpable abdominal mass was detected in 21 cases (26.9%). Other clinical findings were found and documented in (Table 1).

Surgical procedures:

Emergency resection was carried out in 22 out of 27 patients (28.2%), presenting with acute abdomen, and elective resection was performed in 56 patients (71.8%). Curative resection was performed in 58 patients (74.4%) while palliative resection was considered in 20 patients (25.6%). Site of tumour was distributed in the rectum up to rectosigmoid in 23 patients (29.5%), sigmoid colon in 19 patients (24.4%), caecum in 17 patients (21.8%) and the remaining large bowel in 19 patients (Table 2).

Perioperative complications:

Intraoperative injuries encountered in small intestine (3.8%), vessels (2.6%) and ureter (2.6%). Anastomotic leakage was detected in 6 patients (7.7%), two of them passed on conservative treatment. Other complications were encountered (Table 3). Exploration was performed in 10 patients for complications with anastomotic leakage (4 cases), burst abdomen (2 cases), peritonitis (one case), stoma complications (1 case) and localized collection (2 cases). Postoperative mortality was recorded in 5 patients (6.4%); these cases had distribution between different variables, and affecting their corresponding numbers in follow-up group.

(II) Follow-up (73 patients):

Toxicity of adjuvant therapy:

Diarrhea occurred in 6 out of 18 patients with rectal carcinoma and 6 out of 21 patients with colonic carcinoma which resolved on medical treatment. Skin reaction occurred in 3 cases receiving radiotherapy specially in perianal region. Bladder irritation was observed in 5 cases treated by pelvic radiation, stoppage of treatment for one week or more was indicated in 2 of these 5 cases.

CEA estimation:

30 out of 73 patients had raised CEA levels preoperatively (41.1%); of these 21 patients had significantly decreased or normalized CEA levels 3 weeks postoperatively while 9 patients had either insignificant or no decrease in CEA levels postoperatively; 4 cases became normal 6 months after surgery with response to adjuvant therapy. The remaining 5 cases showed persistent elevation with evidence of a relapse; added to 13 patients had re-elevated CEA, on follow-up, all of whom had disease relapse, at the same time relapsing 15 patients showed no significantly increased CEA levels. The net result that 18 cases (54.5%) with relapse showed elevated CEA and 15 relapsing cases (45.5) without elevation of CEA.

Patterns of recurrence:

Relapse was encountered in 33 out of 73 patients with follow-up (45.2%), local recurrence occurred in 22 patients (30.1%), distant metastases in 7 patients (9.6%) and combined local and distant metastases in 4 patients (5.5%) (Table 4). 87.5% of patients with mucinous carcinoma showed relapse, while 33.3% of non-mucinous carcinoma patients had relapse. 69.7% of relapsed patients had positive lymph node metastases (Dukes'C). Most patients with Dukes'C had relapse (79.3%) and to less extent those with Dukes'B (23.5%).

Local recurrence was encountered in 42.9% of rectal carcinoma patients (9 out of 21 cases) and 25% of colonic carcinoma cases (13 out of 52 cases) with no statistically significant differences (P=0.03). Surgery was performed for 45.5% of local recurrence (10 out of 22 cases). Limited resection anastomosis was performed in 3 cases, excision of recurrent masses in 3 cases and laparotomy alone in 4 patients. Postoperative mortality was encountered in 3 patients (30%) of the operated group. Distant metastases were distributed in the liver (6 cases), lungs (2 cases) and combined liver and lung involvement (3 cases). Second line chemotherapy was adopted for patients with distant metastases.

Survival rates:

Overall survival rates in different variables outlined in (Table 5).. Overall survival rate of 73 cases with follow-up was 51% (38 cases) at 42 months of follow-up according to the Kaplan-Meier method (Fig. 1). Patients with Dukes'A had the best survival rate (80%), followed by Dukes'B patients (64%), whereas Dukes'C had the poorest survival rate (27%) (Fig. 2). Overall survival in non-relapsed patients is better than those with relapse (70% vs 32%) with a statistically significance difference (P=0.0001) (Fig. 3). Overall survival in non-mucinous carcinoma is better than mucinous carcinoma (63% vs 19%) with a statistically significance difference (P=0.00001) (Fig. 4). Although elective and curative procedures had overall survival better than emergency and palliative procedures respectively, but with no statistically significance difference.

Table (1): *Clinical features of colorectal cancer.*

Clinical features	*No. of patients **	*% ***
• Large bowel obstruction	25	32.1
• Chronic abdominal pain	39	50
• Palpable abdominal mass	21	26.9
• Palpable rectal mass	19	24.4
• Altered bowel habits	35	44.9
• Weight loss	36	46.2
• Anaemia	27	34.6
• Localized peritonitis	2	2.6
• Rectal bleeding	8	10.3

* More than one clinical feature was encountered in many patients.
** Percentage of 78 patients.

Table (2): *Types of surgical procedures.*

Surgical procedures	*No. of patients*	*% **
• Right hemicolectomy	20	25.6
• Transverse colectomy	6	7.7
• Left hemicolectomy	10	12.8
• Sigmoid colectomy	19	24.4
• Anterior resection	19	24.4
• Abdominoperineal resection	4	5.1
• Single stage resection	71	91
• Multiple stage resection	7**	9
• Curative resection	58	74.4
• Palliative resection	20 ***	25.6
• Emergency resection	22	28.2
• Elective resection	56	71.8

* Percentage of 78 patients
** Two patients were operated on by Hartmann's procedure.
*** Palliative resection was done with hysterectomy and ovariectomy in 2 patients, partial cystectomy in 2 patients, small intestinal resection in 6 patients, tumor spillage in 4 cases, 2 patients with preoperative perforated tumor and 4 cases with positive safety margin.
- Reoperation for complications was done in 10 patients.

Table (3): *Perioperative complications.*

Complications	No. of patients *	% **
• Intraoperative injuries		
- Small intestine	3	3.8
- Urinary bladder	2	2.6
- Ureter	2	2.6
- Left iliac vein	1	1.3
- Inferior vena cava	1	1.3
• Anastomotic leakage	6	7.7
• Peritonitis	1	1.3
• Localized collection	2	2.6
• Wound sepsis	6	7.7
• Burst abdomen	2	2.6
• Stoma complications	1	1.3
• Cardiac troubles	4	5.1
• Chest infections	7	9
• Deep venous thrombosis	3	3.8
• Mortality	5	6.4

* More than one complication was encountered in many patients.
** Percentage of 78 patients.

Table (4): *Patterns of relapse of 73 patients of follow-up group.*

Patterns of relapse	*Site*	*Rectum*				*Colon*				*Total cases*			
	Dukes' stage	*A*	*B*	*C*	*Total*	*A*	*B*	*C*	*Total*	*A*	*B*	*C*	*Total*
	No. of patients	*3*	*10*	*8*	*21(%)*	*7*	*24*	*21*	*52 (%)*	*10*	*34*	*29*	*73 (%)*
■ Local recurrence		1	2	6	9 (42.9)	1	3	9	13 (25)	2	5	15	22 (30.1)
■ Distant metastases		-	1	2	3 (14.3)	-	1	3	4 (7.7)	-	2	5	7 (9.6)
■ Combined local and distant metastases		-	-	2	2 (9.2)	-	1	1	2 (3.8)	-	1	3	4 (5.5)
■ Total relapse		1	3	10	14 (66.7)	1	5	13	19 (36.5)	2	8	23	33 (45.2)

Table (5): *Overall survival of different variables according to Kaplan-Meier method and P Value at 42 months follow-up.*

Variable	*Total no. of patients (73)*	*No. of mortality (35)*	*No. of survival (38)*	*Overall survival rate %*	*P value*
• Stages:					
- A:	10	2	8	80%	0.00001*
- B:	34	12	22	64%	0.0001**
- C:	29	21	8	27%	
• Relapse:					
- Non-relapse	40	12	28	70%	0.0001
- Relapse	33	23	10	32%	
• Pathology:					
- Non-mucinous carcinoma	57	22	35	63%	0.00001
- Mucinous carcinoma	16	13	3	19%	
• Type of surgery:					
- Elective	53	23	30	57%	0.08
- Emergency	20	12	8	40%	
• Extension of surgery					
- Curative	55	26	29	54%	0.7
- Palliative	18	9	9	51%	

* P value between Dukes'A and C.
** P value between Dukes'B and C.

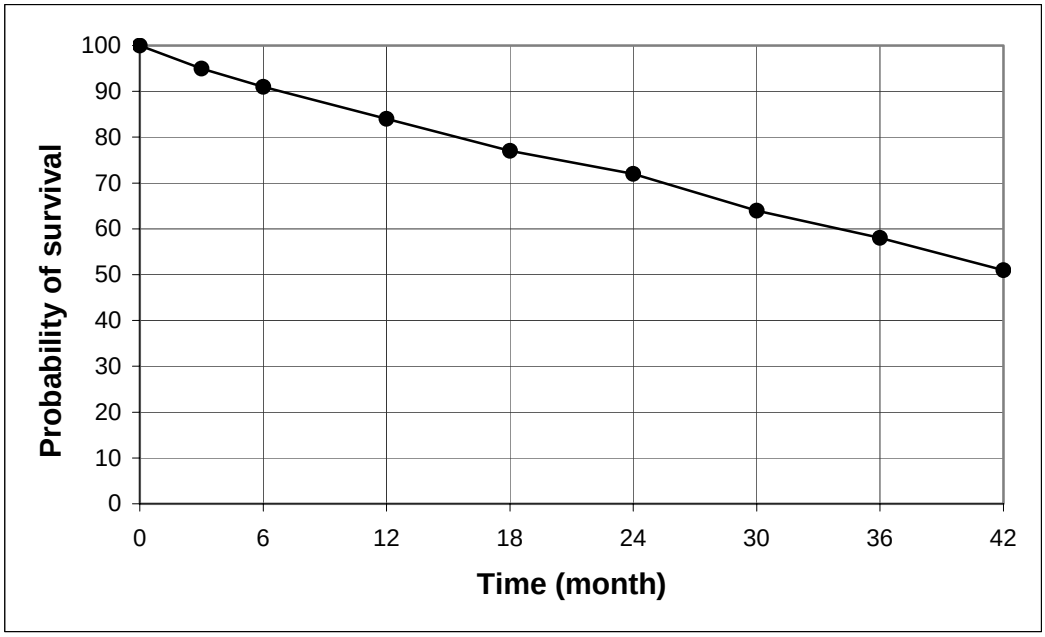

Fig.(1) : Overall survival according to the Kaplan-Meier method of colorectal carcinoma in all patients (Dukes'A, B and C).

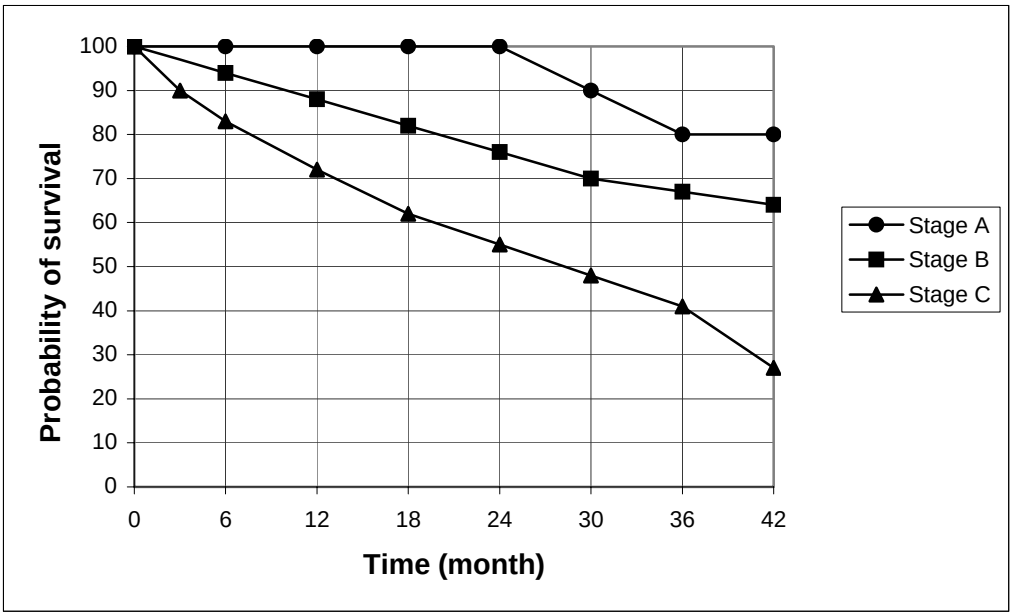

Fig. (2): Overall survival of Dukes'A, B and C stages of colorectal carcinoma according to the Kaplan-Meier method.

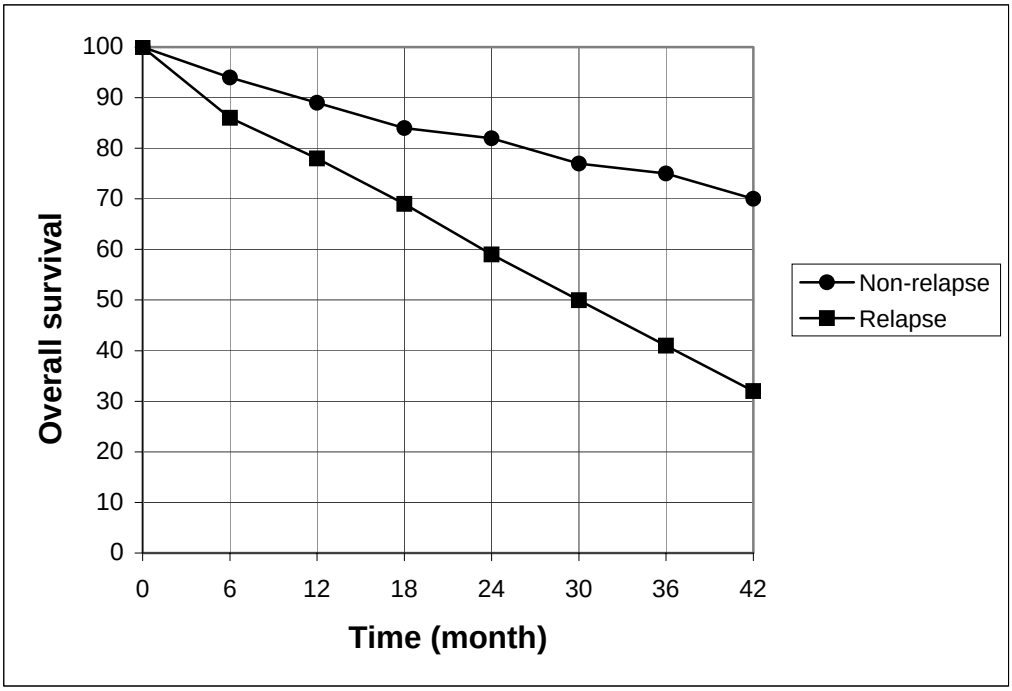

Fig. (3): Overall survival in relapsed and non-relapsed patients according to Kaplan-Meier method.

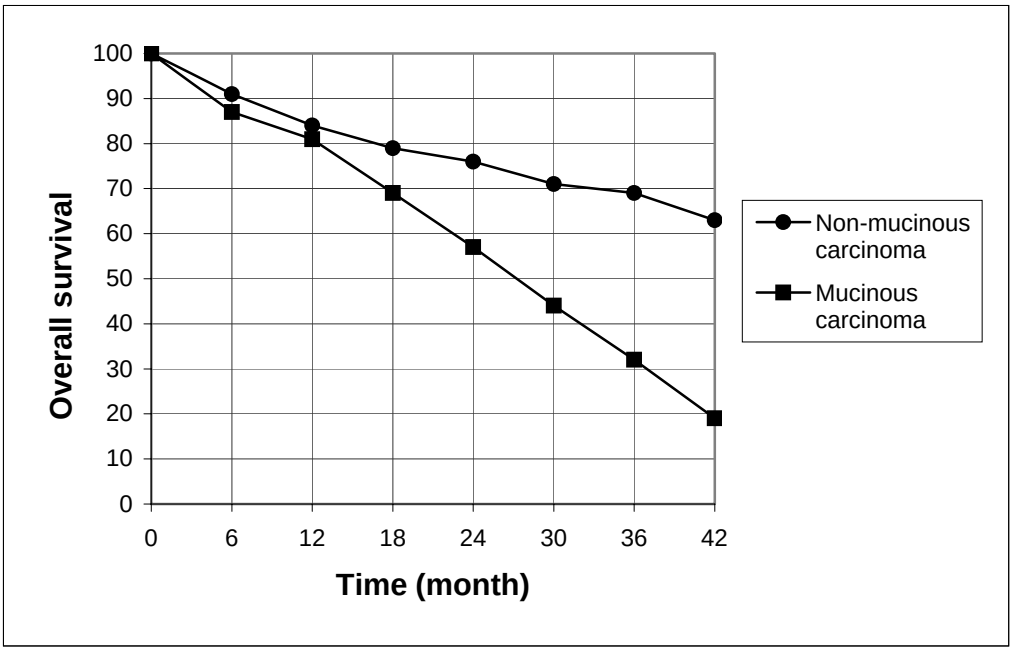

Fig. (4): Overall survival in non-mucinous and mucinous carcinoma according to Kaplan-Meier method.

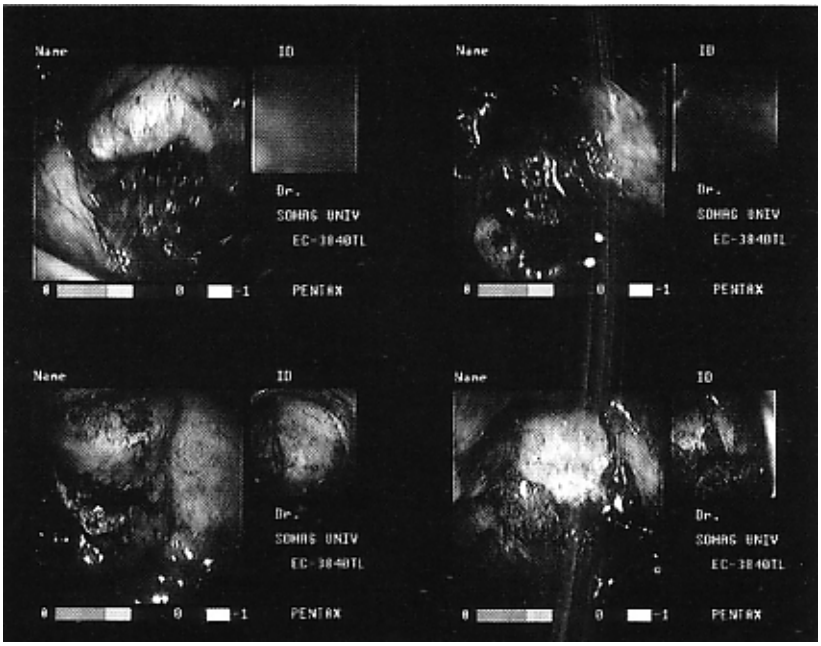

Fig. (5) : Ulcerating cauliflower adenocarcinoma of the rectum at 15 cm from anal verge.

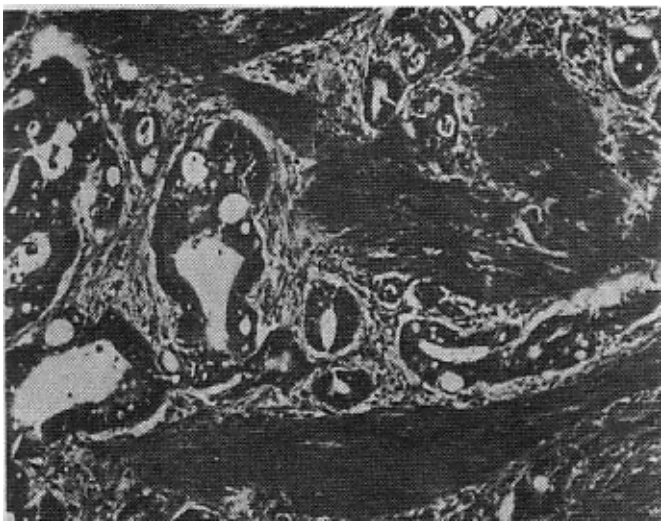

Fig. (6): Adenocarcinoma of colon, Grade II with malignant glands infiltrating the muscle coat.X100.

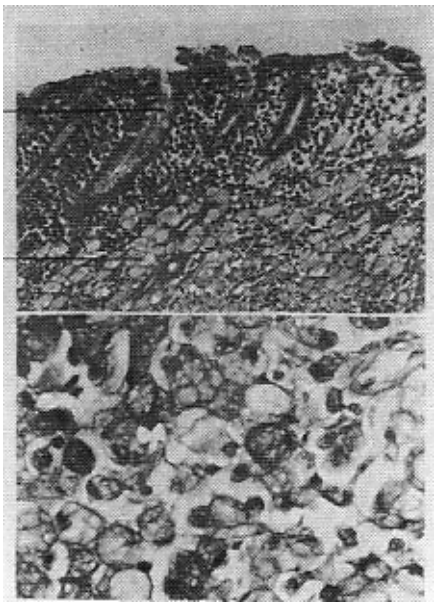

Fig. (7): Mucinous carcinoma of colon with abundant signet-ring cell formation.X40 and X400.

DISCUSSION

Colorectal cancer is the only commonly curable visceral malignancy. At present in the United Kingdom approximately 50% of patients with disease are treated with reasonable expectation of cure of whom 50% can be expected to be alive 5-years later, so the line of treatment in such patients must match a such a survival profile [6]. The colorectal malignancy constitutes 3.08% of all malignancies referred to the National Cancer Institute, Cairo [7]. This figure does not include emergency and early detectable cases which are not referred to the National Cancer Institute, Cairo [8]. Dukes'A was reported in 12.8% of our cases and in 9.14% of Egyptian study on curative rectal carcinoma [9]. Average age in Egyptian patients with colorectal cancer is more younger than elsewhere. It was 43, 40.61 and 44.2 years in our study and other series [8][9] respectively, while it was 65 and 69 years as reported in other studies [6][10].

Incidence of emergency presentation in our cases was 34.6% and it was reported to be 34% of other series [1]. Postoperative mortality rate in the emergency group was higher than the elective group (20.7% versus 3.3%) [11], while in our study it was 13.6% versus 3.6% respectively. As surgery becomes necessary in emergency patients, a combination of alternative techniques is often performed. Interval minimal surgery followed by staged resection is a feasible alternative to treat aged patients [12]. Primary resection and anastomosis of obstructed left sided colorectal carcinoma is still debatable. It was found that anastomotic leaks occurred in 6% of the elderly patients and 4% of younger patients respectively [13], while other studies suggest that this procedure can be performed safely in selected cases [10]. The development of new endoprosthesis has enabled relief of large bowel obstruction before operation [14] but it has liability of perforation.

En-block surgical resection is the primary treatment of colorectal cancer. Anastomotic leakage in our study was 7.7%. The overall incidence of anastomotic leakage was 13% and generally ranges from less than 5% to over 30%. Anastomotic leakage resulted in a 2-folds increase in duration of hospital stay and a 3-folds increase in mortality [1]. Postoperative mortality in our study was 6.4% and it varied from 8-26% in different series in all stages of the disease [1]. Pathologic studies indicate that tumor rarely spreads more than 1.2 cm longitudinally beyond the area of gross involvement and a 5cm margin is more than adequate, and can be lowered in patients with cancer from 6 to 11cm from the anal verge especially in cases of early Dukes' stages, and well and moderately differentiated adenocarcinoma. It was found that abdominoperineal resection with permanent colostomy does not yield survival results superior to those achieved with sphincter saving surgical treatment [9,15]. Recent studies have suggested that local recurrence rates following rectal cancer surgery are reduced if the mesorectum is removed intact within its fascia propria [16]. It should be emphasized that for carcinoma of the colonic flexures and the transverse colon, extended radical resections such as right and transverse, left and transverse or subtotal colectomies are indicated. It was observed that 5-year survival for all stages was 51% after

conventional surgery and 62% after extended surgery with no statistical significance[17]. Curability A (no residual tumor) should be performed to improve survival in the patients with macroscopic invasion into adjacent organs [18]. There is evidence that adherent viscera i.e. small intestine, omentum, ovaries or fallopian tubes, the tumor resected en-block as these adhesions often prove to be of an inflammatory nature rather than due to malignant infiltration [19].

Pattern of recurrence in our cases was encountered in 45.2%, including local recurrence in 30.1%, distant metastases in 9.6% and combined local and distant metastases in 5.5% at 42 months follow-up. Rectal carcinoma had a higher local recurrence rate than colonic carcinoma (42.9% versus 25% respectively) with no statistically significance difference (P=0.03). Other series detected relapse in 27.9% and anastomotic recurrence were higher for rectal than colon lesions (20.3% versus 6.2%) (P=0.001). Distant metastases developed in 13.9% of patients with colon carcinoma and 15.5% for rectal carcinoma ([20]. In Egyptian study on curative colorectal carcinoma, relapse was encountered in 66.7% in patients with Dukes B and C. Local recurrence was encountered in 52.1%, distant metastases in 8.3% and combined local and distant metastases in 6.3%. 75% of relapsed cases had lymph node metastases (Dukes'C) and 78.1% of them exhibited serosal invasion [8].

Factors, which predicted local recurrence of colorectal cancer, included Dukes' classification, emergency intervention, lack of tumor mobility and variation in the technique of performing surgical procedures and especially for rectal tumors [1][21]. Recurrence in the first postoperative year was less likely to be candidate for curative resection than recurrence in the second through fourth follow-up years. The majority of recurrence expected to occur in the first 2 postoperative years (60% to 80%), 90% within 4 years after treatment. The most common affected sites are the liver, lungs, remaining colon and previous site of resection, and these areas are the most common investigated [3][22].

Surgical resection remains the only option for long-term curative palliation in recurrent tumors [23]. On exploration, it was found that 25% to 50% of patients have irresectable disease. It is possible to perform a total resection of the recurrences and of the infiltrated structures or palliative resection [24]. Postoperative mortality in these cases accounted for 30% of our operated cases and other study reported 7% mortality, 40% morbidity and 27% overall survival rate. Resection should be attempted whenever possible and long-term results might be improved with adjuvant therapy [25].

Studies revealed clear relationships between preoperatively elevated CEA levels and risk of recurrence[26]. In patients with an elevated preoperative CEA, postoperative return to normal is a reasonable assurance that a curative resection has been performed. Furthermore a significant persistent increase in CEA after curative resection has been demonstrated to be significantly correlated with recurrence, and an increase in CEA levels usually preceeds clinical symptoms [27][28]. An increase in the CEA level on two consecutive dates warrants further evaluation to rule out recurrence. The role of postoperative CEA surveillance is ever less clear when it is not elevated preoperatively [3]. In our study, 41.1% of cases had preoperative elevated CEA and 54.5% of relapsing cases showed persistent or re-elevation of CEA on follow-up while 45.5% of relapsed cases without elevation of CEA. The development of monoclonal antibody technology has allowed for the application of tumor specific radiolabelled probes in the investigations of metastatic disease. Radioimmunoscientigraphy is more sensitive and specific than CT scanning [29].

Overall survival in our cases was 51% at 42 months. Patients with Dukes'A have the best overall survival (80%), followed by Dukes'B (64%) and Dukes'C (27%). Stages, relapse and type of pathology had a statistically significant difference in overall survival in our study. In Egyptian study, serosal invasion, lymph node status and tumor staging proved to be informative parameters to predict biologic behaviour. A high recurrence rate correlated significantly with these factors. 3-years disease free survival was 8.3% of patients with mucinous carcinoma compared to 41.7% of non-mucinous tumors [8]. Locoregional recurrence has a significant influence on 5-years survival [17]. It was found that 50% of patients with curative resection have 5-years survival rate [1], while specialist centres reported higher resection and survival rates [30]. Other series found Dukes'A with 80% 5-years survival rate, B with 73% and C with 40% [31]. Three fourths of patients with node negative rectal cancer are cured by radical surgical resection. Dukes'A was 80% actuarial, Dukes'B was 61% and Dukes'C was 40% and total overall survival was 58% [32].

In 1990, a large intergroup trial of 5-FU and levamisole reported prolonged disease free survival and overall survival in patients with stage III colon cancer[33] compared to those who received no treatment after surgery, these results are uncertain in stage II patients [34]. Adding leucovane to 5-Fu improved response rates, palliation of symptoms but not always in terms of survival to locally advanced disease [35]. 45% of patients with colorectal cancer have positive lymph nodes, one of the most significant predictions of survival. This evidence suggests that systemic chemotherapy with 5-FU, leucovane, levamisole or other lines will decrease recurrence and increase survival for patients with Dukes'C colon cancer. Rectal cancer with B and C, combined radiation and 5-FU increase survival and decrease local and distant metastases [36][37].

Preoperative assessment and postoperative care will lead to a decrease in perioperative morbidity and mortality.

Although primary resection anastomosis of obstructed left colorectal tumors in selected cases has many advantages, staged resection should be performed when indicated. Extended colonic resection of colonic flexure tumors has not significant survival rate than conventional resection. As regard rectal carcinoma mesorectal excision will decrease local recurrence. Distal safety margin of 2 cm of middle 1/3 tumor in selected cases will reduce number of patients with permanent stoma which showed survival rate similar to that of abdominoperineal resection. Patients with infiltrated adjacent organs should be resected en-block with primary tumor. A significant persistent or re-elevation of CEA after curative resection has been demonstrated to be significantly correlated with relapse. Adjuvant chemotherapy should be given to patients with Dukes' C colon cancer and combined chemoradiotherapy to Dukes'B and C rectal cancer.

In conclusion, this study outlined results of management of colorectal carcinoma (Dukes'A, B and C) which form guidelines in treatment. This study showed that relapse is related to stage of disease, type of pathology and site of tumour. Overall survival of colorectal cancer is based on the stage of the disease, type of pathology and relapse. The detection of the disease at an early stage is important and strict surveillance is essential for those with high risk. Introduction of recent diagnostic modalities may help for this.

REFERENCES

1. Mc Ardle CS, Murray GD, Hole D: Outcome following surgery for colorectal cancer. Recent Advances In Surgery, 1997; 20, pp 129-143.

2. Greenle RT, Murray T, Bolden S et al: Cancer statistics. Cancer J Clin 2000; 50:7-33.

3. De Vos W: Follow-up after treatment of colon cancer; Colon and Rectal Cancer edited by Peters Edelstein by Wiley Liss, Inc, 2000; pp 225-240.

4. Mc Ardle CS, Hole D, Hansell D et al: Prospective study of colorectal cancer in the West of Scotland – 10 years follow-up. Br J Surg 1990; 77:280-282.

5. Renault AJ, Taylor I: What's new in general surgery – a review of the journals. Recent Advances in Surgery, 1999; 22:187-217.

6. Hartley JE, Mehigan BJ, Mac Donald AW, et al: Patterns of recurrence and survival after laparoscopic and conventional resections for colorectal carcinoma. Ann of Surg, 2000; Vol 232, No 2, 181-186.

7. Mokhtar N: Cancer pathology registry 1985-1989: National Cancer Institute, Cairo University 1991; p 5.

8. Taha H, El-Mongy MM, Gamil IM: Prognostic value of p53 overexpression in colorectal carcinoma. Journal of the Egyptian Nat Cancer Inst, 1996; Vol 8, No 1, June: 71-81.

9. Khaphagy W, Wali M, Farakha M et al: Distal tumor intramural spread of cancer rectum. Journal of the Egyptian Nat Cancer Inst, 1999; Vol 11, No 4, December:325-329.

10. Chiappa A, Zbar A, Biella F et al: One stage resection and primary anastomosis following acute obstruction of the left colon for cancer. Ann Surg, 2000; 66(7):619-22.

11. Taylor I: What's new in the journals. Recent Advances in Surgery, 1997; Vol 20: 259-285.

12. Koperna T, Kisser M, Schalz F: Emergency surgery for colon cancer in the aged. Arch-Surg, 1997; 132(9):1032-7.

13. Poon RT, Low WL, Chu KW: Emergency resection and primary anastomosis for left sided obstructing colorectal carcinoma in the elderly. Br J Surg, 1998; 85:1539-1542.

14. Akle CA: Endoprostheses for colonic strictures. Br J Surg, 1998; 85:310-314.

15. Williams NS, Dixon MF; Johanson D: Reappraisal of the 5-centimeters rule of distal excision for carcinoma of the rectum; a study of distal intramural spread and patient survival. Br. J Surg, 1983; 70:150-154.

16. Brissett IP, Mckay GS, Parry BR et al: Results of extrafascial excision and conventional surgery for rectal cancer at Auckland Hospital. Aus NZ Surg, 2000; 70(10):704-9.

17. Kessler H, Mansmann U, Hermanek Jr P et al: Does the surgeon affect outcome in colon carcinoma? Seminars in Colon and Rectal Surgery, 1998; Vol 9, No 4, (December), pp 233-240.

18. Nakamara T, Yoshioka H, Obno M et al: Clinicopathologic variables affecting survival of distal colorectal cancer in patients with macroscopic invasion into the adjacent organs. Surg Today, 1999; 29:226-32.

19. Giles GR: The colon, rectum and anal canal, In Cuschieri A, Giles GR, Moosa AR (eds): Essential Surgical Practice, 2nd ed. London, WRIGHT, 1988; pp 1193-1231.

20. Obrand DI, Gordon PH: Incidence and patterns of recurrence following curative resection for colorectal carcinoma. Dis Colon Rectum, 1997; 40:15-24.

21. Kessler H and Hermanek P: Outcomes in rectal cancer surgery are directly related to technical factors. Seminars in Colon and Rectal Surgery, 1998, Vol 9, No 4, (December), pp 247-253.

22. Peethambaram P, Weiss M, Loprinzi CL et al: An evaluation of postoperative follow-up tests in colon cancer patients treated for cure. Oncology, 1997; 54(4):287-92.

23. Guillem JG and Rou L: Strategies in Operative Therapy for Locally Recurrent Rectal Cancer. Seminars in Colon and Rectal Surgery, 1998; Vol 9, No 4, (December), pp 259-268.

24. Fabbri C, Cirocchi R, Rossi P et al: Surgery of local recurrence in rectal cancer, Mnerva-Chir, 1997; 52(1-2):21-4.

25. Delpero JR, Pol B, Le Treut YP: Surgical resection of locally recurrent colorectal adenocarcinoma. Br J Surg, 1998; 85:372-376.

26. Wong JY, Young R, Chiang JM: Value of carcinoembryonic antigen in the measurement of colorectal cancer. Dis Colon Rectum, 1994; 37:272-277.

27. Martin EW, Cooperman M, Carey LC et al: Second-look procedures indicated primarily by rise in serial carcinoembryonic antigen. J Surg Res, 1980; 28:389-399.

28. Hine KR, Dykes PW: Serum CEA testing in the postoperative surveillance of colorectal carcinoma. Br J Cancer, 1984; 49:689-693.

29. Avital S, Haddad R, Troitsa A et al: Radioimmunoguided Surgery for Recurrent Colorectal Cancer Manifested by Isolated CEA Elevation. Cancer, 2000; Vol 89, No 8:1692-1698.

30. Mac Farlane JF, Ryall RDH, Heald RJ: Mesorectal excision for rectal cancer. Lancet, 1993; 341:457-460.

31. Eisenberg B, Decosse JJ, Harford et al: Carcinoma of the colon and rectum: the natural history reviewed in 1704 patients. Caner, 1982; 49:1131.

32. Phillips R, Hitlinger R, Blesovsky L et al: Local recurrence following curative surgery for large bowel cancer. The overall picture. Br J Surg, 1984; 7:12-16.

33. 33- Moertel CG, Fleming TR, Macdonald JS, et al: Levamisol and Fluorouracil for adjuvant therapy of resected colon carcinoma. New England Journal of Medicine, 1990; 322(6):352-358.

34. Brown ML, Nayfield SG, Shibley LM: Adjuvant therapy for stage III colon cancer: economic returns to research and cost effectiveness of treatment. Journal of National Cancer Institute, 1994; 86(6):424-430.

35. Borner MM, Castiglione M, Bacchi M, et al: The impact of adding low-dose leucovarine to monthly 5-fluorouracil in advanced colorectal carcinoma: results of a phase III trial. Annals of Oncology, 1998; 9(5):535-541.

36. Link KH, Staib L, Kreuser ED, et al: Adjuvant treatment of colon and rectal cancer: impact of chemotherapy, radiotherapy and immunotherapy on routine postsurgical patient management. Recent Results Cancer Res. 1996; 142:311-52.

37. Kemeny N, Saltz L, Cohen A: Adjuvant therapy of colorectal cancer. Surg Oncol Clin N Am. 1997 Oct; 6(4):699-722.